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Tin Near the Upper Limit

THE approaching termination of the current International Tin Agreement, which expires on June 30, finds tin within striking distance of the price of £880 a ton, at which the buffer stock manager ceases to have any discretion and is forced to sell. In view of the upturn in the U.S. economy and the brightening outlook for world trade, it becomes increasingly probable that the International Tin Council, during the period covered by the new Agreement, will be more concerned with avoiding a runaway market than with preventing prices from falling through the stipulated floor.

As it prepares to embark on this new five-year agreement, the I.T.C. is faced with three main problems. What can be done to raise production? How quickly and under what circumstances will the U.S. Congress be prepared to make strategic stockpile tin available to avert shortage and consequent market dislocation? Will available stocks bridge the gap until then?

In the long term, the problems of higher output can only be solved by finding and developing new deposits or by sufficiently major advances in recovery techniques to permit of the working of submarginal ground or the reworking of old ground. In the short term a higher price level will undoubtedly bring out more metal provided there is adequate evidence that these higher prices will persist. Small mine workers will automatically come back into production under these circumstances but re-equipping for large scale working of marginal ground calls for a reasonably assured minimum price.

Although provision exists in the new agreement for revising the lower, middle and upper price ranges as experience dictates, producers will surely be extremely wary of the psychological consequences of such action on consumers who are increasingly ready to seek refuge in substitution in the face of sharply rising—or even sharply fluctuating—prices. Nevertheless, it will not be altogether surprising to see some lifting or widening of the price ranges. Bolivia for one is known to be dissatisfied with an £880 ceiling price and this might prove a decisive influence at a time when Washington is lending a particularly sympathetic ear to that country's economic problems. The significance of this lies in that, under conditions of acute shortage, the deciding factor in price levels will not be the price level written in the tin agreement but the price at which Washington is prepared to release stockpile tin. As the world's primary consumer the U.S. thus has a nice problem in reconciling the interests of her own manufacturers with the economic problems of primary producing countries whose exports are heavily dependent on tin.

Aside from the price at which Washington will be prepared to release buffer-stock tin, there is also the question of how quickly such tin can be made available. In the somewhat doubtful eventuality of the Administration wishing, and being able, to get legislation through before Congress rises in August, tin from this source would



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presumably be available next January or February. Otherwise it would not be available before July or August of next year. The fact that the I.T.C. communiqué after last week's meeting was singularly non-committal suggests that there is no certainty yet on this matter. It is to be hoped that by the time the Council meets again by the end of June, we shall all know where we stand.

Meanwhile, what are the prospects for bridging the gap in any event until next February, and possibly until next July?

All sections of the tin industry now recognize the inevitability of a deficit during 1961, which will have to be relieved by sales from the buffer stock. In their review of the tin market for May, 1961, A. Strauss and Co. Ltd. ascribe the present pressure on tin prices to a number of causes. In the first place, as invariably happens in such a situation, the normal buying of consumers to meet their immediate requirements has been augmented by additional forward purchases, resulting in the emergence of a contango. At the same time there has been a fair amount of speculative buying on the L.M.E. which may now be liquidated with the approach of the slack buying season, so that in practice, the buffer stock manager may not be forced into heavy selling until September.

The upward movement in prices has been further accelerated by substantial buying from U.S. tinplaters, whose return to the market on a considerable scale was the inevitable sequel to the prolonged destocking movement in the United States. At the same time there has been abnormal buying by West German interests of metal for conversion into high-grade tin alloy, most of which is sold to the United States. For some years this trade has been encouraged by the German authorities by an attractive currency concession, which has now been withdrawn.

Meanwhile, the tonnage of daily sales from producing countries, as a whole has actually been falling. During the first quarter of 1961 Malayan production of tin-in-concentrates amounted to 13,142 tons, which was 742 tons below that of the last quarter of 1960, and prospects for any significant increase in output are not at all encouraging.

The extent of this year's deficit of production over requirements is widely estimated at 10,000 to 15,000 tons, although the improving outlook for U.S. tin plate manufacturers has given rise to estimates ranging up to 30,000 tons. Aside from rising consumption, the figure will also be dependent on the volume of Russian and Chinese exports, but on the assumption of these being between 8-10,000 tons, a deficit on the year of 10,000 to 15,000 tons at present seems a reasonable expectation.

In these circumstances the buffer stock manager has clearly been wise to make no serious attempts to cushion the price rise between £830 and £880, though he is known to have made occasional sales between these limits. It is generally believed that, as a result of this policy, he has 8,000 to 9,000 tons available to sell at the top figure. It is evident, however, that unless and until adequate reserves can be made available the buffer stock manager's influence over the market must diminish with every ton he sells.

The only other certain source of supply is the Canadian stockpile of 3,000 tons, which is to be sold over a period of ten months, but there is another potential source in the 4,000 tons of metal which the U.S. government took over when the Texas smelter was sold and which is held outside the strategic stockpile.

There are thus between 15,000 and 16,000 tons, which the buffer stock manager and the Canadian and U.S. governments can between them make available to the market. This can in all probability bridge the gap until next February, but if U.S. strategic stockpile tin is not available

by then, there must be very grave doubts regarding the I.T.C.'s ability to keep the situation under control until July, unless shipments can be resumed from the Congo in the interval. There have been virtually no shipments since the beginning of this year but production, no doubt on a reduced scale, is reported to have been continuing and quite substantial stocks may by now be awaiting shipment. Nevertheless, the expectation of an early solution to the Congo's difficulties scarcely provides a foundation on which the I.T.C. can plan.

Such difficulties as the I.T.C. may have next year are more likely to arise from unnecessary panic buying than from an absolute shortage. It is not so very long ago that the Tin Agreement came near to floundering through an under-estimation of the size of consumer stockholdings and this experience gives some ground for hoping that if panic can be averted, consumers will be able at a pinch to weather the storm by running down their stocks, especially as once tin is releasable from the stockpile, it will become immediately available in the U.S.—a saving of some three months over the normal delivery period from Malaya. Above all, therefore, what is needed for market stability over these next months is a clear statement of Washington's intent regarding the timing of stockpiling releases—and the minimum market price at which such releases would be authorized.

Producers and consumers alike would welcome co-operation between the U.S. government and the I.T.C. to eliminate panic buying and keep prices from rising to levels which would put a further premium on substitution. Despite the growing competition of aluminium and plastics in certain markets, tin's supremacy has yet to be seriously endangered so far as the great bulk of its outlets are concerned. No metal, however, is immune from the challenge of modern technology, if the incentive for substitution is sufficiently great.

Assuming that world consumption continues expanding, it is evident that, without a corresponding increase in world production, even the U.S. stockpile would not be large enough to bridge the gap for more than a few years. Only by the discovery and development of new sources of supply coupled, of course, with the economic working of what is at present sub-marginal ground, can tin's traditional position as a major metal be assured. It is to these ends that the industry's own efforts, together with government policy in the producing countries, must be primarily directed.

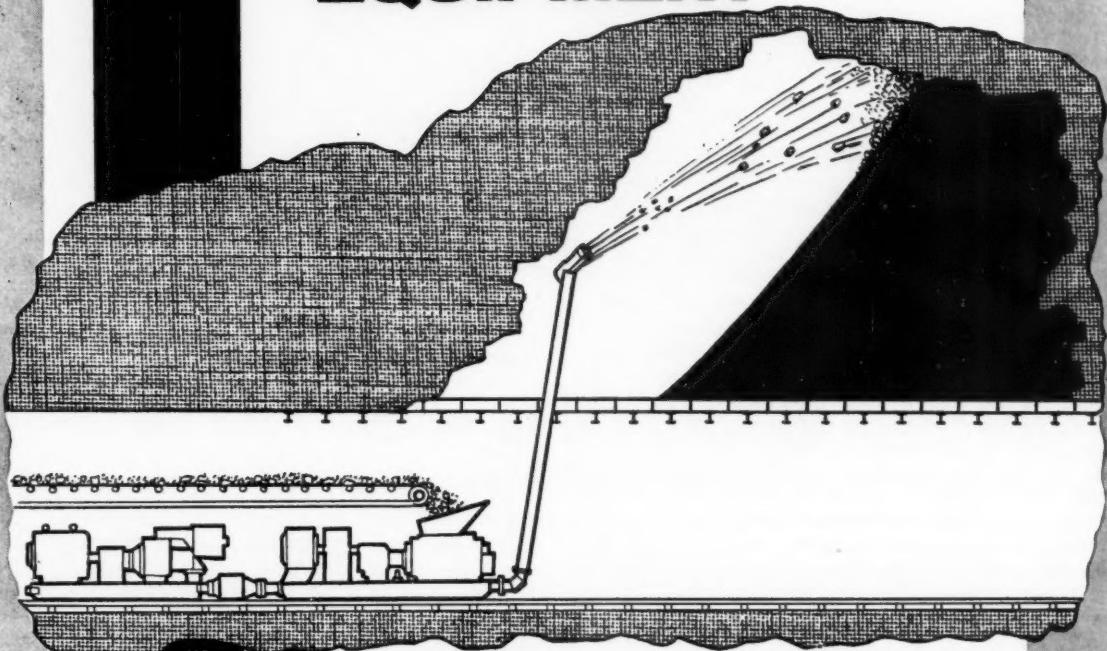
NEW MINING RECORDS FOR AUSTRIA

According to final figures issued by the Austrian Ministry of Trade in Vienna, the country's mining industry last year recorded a production value of 2,960,000,000 Schilling and the metals industry one of 3,540,000,000 Schilling. This latter figure excludes 8,750,000,000 Schilling representing the production value of the ferrous metals producing industry. This latter industry showed the sharpest rise of any over last year, the production value being higher by 28.3 per cent than that for 1959. The increase of the mining industry was of 14.8 per cent over the year, this comparing with a fall of 13.9 per cent over the previous year. The metals industry recorded a rise of 16.1 per cent, or virtually of the same degree as over 1959. Styria was the leading Austrian State in mining production during 1960.

Austria, which in pre-war years was an ore exporter, last year had to import ores worth a total of 620,000,000 Schilling due to the increased demand of the national iron and steel industry. Over 1959 such imports had been of only



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215,000,000 Schilling. Austrian exports of ferrous metals during 1960 stood at a value of 5,585,000,000 (4,245,000,000) Schilling, or 19.2 per cent of total exports.

Austrian production of sinter magnesite over last year is now stated to have been 499,500 tonnes, as against only 382,000 tonnes in 1959. That of caustically-burnt magnesite rose over the year from 102,300 tonnes to 120,700 tonnes and that of magnesite rocks from 186,000 tonnes to 260,200 tonnes. The former production record, set up in 1958, was thus beaten in every sector. Exports of sinter magnesite, of 215,000 tonnes, were last year worth 238,000,000 Schilling, compared with a 1959 export value of only 178,000,000 Schilling. Exports of caustic magnesite stood at 97,000 tonnes worth 71,000,000 Schilling (1959 exports worth 62,000,000 Schilling).

HELPING TO PAY FOR THE REPUBLIC

The call for a strike in South Africa at the time of the Republic celebrations has been a failure, by comparison with some of the upheavals caused by nationalist Africans throughout Africa north of the Limpopo.

However, the Africans themselves, particularly the African National Congress, are probably not despondent about their effort. A protest has been registered which has received wide publicity in both sections of the national press and in the international press. The government has been forced to maintain elaborate security measures, not only in the large townships but throughout the country, and the reservists have been called out. Thus the African nationalists have forced the government to hold the celebrations under what is tantamount to a state of emergency and the irony of the government having to apply to the magistrates for permission to hold the celebrations at all has not been missed.

On the other hand the nationalist government is no doubt pleased with itself in that it has demonstrated to the world that it can maintain peace and order in the country without bloodshed and that police are in complete control of the situation. What impression on world opinion is made by this picture is, of course, another matter.

Despite the momentary distraction of the Republic celebrations, the Union's most urgent problem remains that of her foreign reserves. At the end of last week the gold and foreign exchange reserves stood at £74,300,000 compared with £121,900,000 this time last year. Over the past three months the loss on foreign exchange account has averaged £1,270,000 per week. The government has announced restrictions on imports by which it is planned to save annually £100,000,000. This on present statistics should reverse the current drain on the Union's resources but it assumes that the export trade will not fall. This assumption is probably valid, at least in the short term, but a simple reversal of the present trend will not be enough. South Africa must build up her reserves to last year's level as a minimum requirement and beyond that must earn sufficient to purchase the capital goods for the expansion programme that must be an integral part of any scheme to improve the standard of living of the African.

Every balance of trade has two sides of which imports is only one. Moreover, a policy of drastic import restrictions can at best only be regarded as a short term expedient. It is the export market that must be expanded and this must mean more gold.

South Africa is not yet an industrialized country in any European sense and thus the widely rumoured devaluation of the Rand would be of little benefit. In fact, being

primarily an exporter of gold, there appears to be no advantage whatsoever in devaluation so long as gold continues to have an assured market. Moreover, having only recently introduced the new Rand currency the effect of devaluation upon its prestige could be disastrous.

In order to increase her exports South Africa must look to her natural resources and (in view of possible embargoes on agricultural produce) more particularly to mineral resources. In *The Mining Journal* supplement on April 28, the importance of the expansion of the gold industry was discussed. This obviously remains the most important single means, whereby, with a relatively small capital investment, the Union can expand her export trade. However gold must not be allowed to overshadow the other important metals and minerals which South Africa produces.

Intrinsically, South Africa's financial problem is not insoluble. Initially it requires a tight control on imports, which has already been introduced, and further a realistic approach to the export market with a planned expansion in the production of her metal and mineral products, particularly gold. Judging from the government's policies in the past, this expansion will undoubtedly be left to private enterprise, the government simply providing the necessary impetus. It may well be that South Africa's mining industry has a part to play in the near future unequalled in its previous history.

GEOLOGICAL FIELD WORK IN THE SOLOMONS

Although the Geological Survey team in the British Solomon Islands has discovered good grade copper sulphide at Hidden Valley on the southern slopes of Mt. Gallego, and the results gave 19 assays in excess of 2 per cent copper and five in excess of 5 per cent copper, it appears that until recently neither local nor foreign prospectors showed the slightest interest in the area, which is very accessible from the coastal plantations. It is now understood, however, that a Canadian mining company has applied for a lease to prospect 20 sq. miles of the country, and it is possible that this coming dry season will see some activity there.

The last geological record (1957-8) reviewed in *The Mining Journal*, Jan. 27, 1961, p. 109, drew attention to the fact that geological surveys had shown the Hanesava manganese deposits to be mineable. In the meantime operations were started at Hanesava—the Protectorate's first hard rock mine—in January, 1960. Up to July last 176 tons of high grade battery manganese had been exported, but for alleged failure of the lessee to comply with the mining ordinance the lease is shortly to revert to the Protectorate when the concession will be subjected to detailed examination and sampling by the Geological Survey.

Although it was not included in the B.S.I. Geological Record (1957-8), a three-year research project on the ultrabasic rocks of the Solomons was undertaken between January, 1957 and November, 1959 which enabled a new reference work on these rocks to be prepared by Mr. R. B. Thompson. This project covered 170 sq. miles of ultrabasic rocks, stretching over 380 miles of the islands, and this area was found to contain nickel silicates, chromite and chrysotile asbestos. This useful co-operative venture by two geologists, financed by two overseas companies and supported by the Geological Survey's transport and field resources, has been followed up by another project, also financed partly by an overseas company—a two year search for nickel which began last month.

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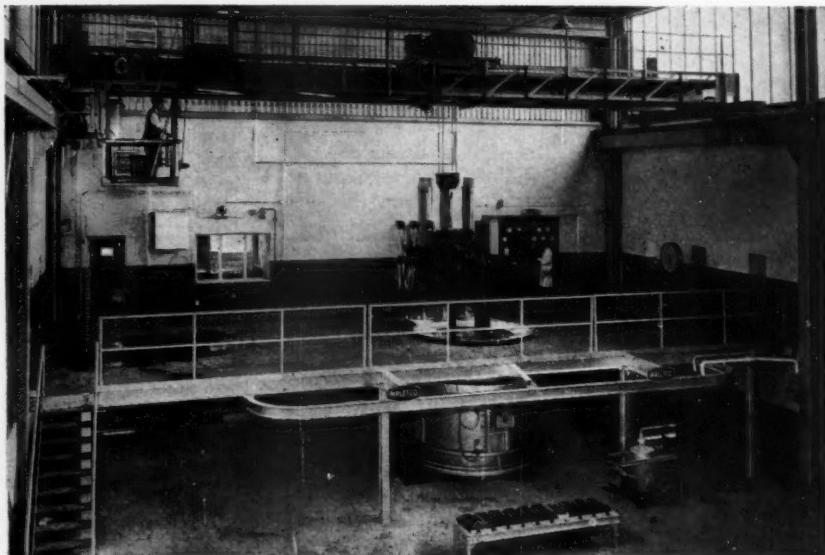
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For the first time in this country a contract service is available for electric smelting. A pilot smelting furnace, built by Birlec-Efco (Melting) Limited, is in operation at the Company's Aldridge premises to promote the development of electric smelting processes. The furnace, which is available to companies throughout the world, provides full scale testing facilities for the mining and electro-chemical industries.

Raw materials are accepted in trial batches for testing their amenity to electro-thermal reduction and for determining the most suitable smelting technique and the nature of the resultant products. At a fee agreed in advance the pilot smelting furnace is operated on customers' raw materials. Finished products and the balance of materials are returned to customer. At the end of the test Birlefco presents a full report giving recommendations on smelting practice, electrical ratings and size of installation required for a given output.



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The Story of The Consolidated Zinc Corporation Ltd.

A GROUP brochure published by The Consolidated Zinc Corporation Ltd., tells the story of a thriving Anglo-Australian partnership. The seed of this co-operation having been sown at Broken Hill, Australia, with the formation of The Zinc Corporation in 1905, it germinated with the development, through the Imperial Smelting Corporation, of the zinc industry in the United Kingdom following the First World War. It has since grown into the many-sided activities of The Consolidated Zinc Corporation Group of Companies which include mining at Broken Hill, lead smelting, zinc smelting and acid production in Australia and the United Kingdom; the recovery of minerals from the beach sands on Stradbroke Island, off the coast of Queensland; developments in fluorine chemistry; the Imperial Smelting blast-furnace process; bauxite investigations in the Cape York peninsula, Queensland; and investments in mining companies and prospecting for new mines in Canada.

Initially, the Zinc Corporation was formed to treat by flotation processes more than 6,000,000 tons of zinc bearing residues which had accumulated in huge dumps at Broken Hill, but as zinc concentrating processes improved, the mine treatment plants ceased to dump residues rich in lead and zinc and The Zinc Corporation had to acquire a producing mine. Accordingly, in 1911, the company acquired the leases of Broken Hill South Blocks NL, which soon proved to be one of the greatest concentrations of mineralization on the Broken Hill field. Other southern leases, added later, were to become the basis of the newest of the mines now operating—New Broken Hill Consolidated Ltd., now the second largest tonnage producer on the field.

Following negotiations between the British and Australian Governments which culminated in 1917 in the signing of a long-term agreement for the purchase of Australian concentrates by the British Government, the National Smelting Co. was formed in Britain in that year to produce zinc and sulphuric acid, acquiring from the Ministry of Munitions a sulphuric acid plant at Avonmouth, together with a partially built, horizontal distillation, zinc smelter.

In 1929, the National Smelting Co. passed into the control of the newly-formed Imperial Smelting Corporation Ltd., with which move came the capital for further development and the arrangements with The Zinc Corporation and other Broken Hill mining companies in Australia for the supply of concentrates on a long-term basis.

Formed in 1949 with an authorized capital of £20,000,000 and with an issued capital now standing at £17,800,000, the Consolidated Zinc Corporation Ltd. (CZC) now co-ordinates and controls the activities of the associated companies in Australia and the United Kingdom.

U.K. Subsidiaries

The head office of the parent company (CZC) and of its U.K. subsidiaries are in London. The chief of these subsidiary companies is the Imperial Smelting Corporation Ltd., which operates a number of plants in various parts of Britain.

Zinc smelting is carried out at Avonmouth and Swansea, a substantial part of production being by the Imperial Smelting process, lead being recovered in addition to zinc.

This brief summary of the history and activities of The Consolidated Zinc Corporation based on a recent group publication presents an absorbing background to the chairman's statement on page 648

Other activities at Avonmouth include the production of sulphuric acid, cadmium, hydrofluoric acid, related fluorides and fluorine products (including Iscon which is used in refrigeration and as an aerosol propellant). Research and development work is also undertaken. Sulphuric acid is also manufactured at Swansea and this includes production by a new plant to process ferrous sulphate from waste liquor from steel works in South Wales.

At Widnes, lithopone, zinc sulphide, barium chemicals and zinc oxide are produced, the latter also being a product of the company's Barry Port plant. At Bloxwich, zinc dust is produced for the chemical and paint industries, zinc alloys for die casting and zinc anodes for cathodic protection. Sulphuric acid is also manufactured at Seaton Carew and Newport, Mon., while barytes is mined by the company at Gasswater.

Another associated company in the U.K. is Consolidated Beryllium Ltd., in which CZC has a 50 per cent interest, which produces beryllium metal and beryllium-copper master alloy at Avonmouth and beryllia ceramics at Milford Haven, where analytical and research work on beryllium is also carried out. Pure Chemicals Ltd., a further British associate company, produces stabilizers for the plastics industry and fine chemicals at Kirkby, Liverpool.

Australian Activities

In Australia, the CZC group activities are managed by The Consolidated Zinc Proprietary Ltd., with head office at Melbourne. Operations are carried out by a dozen or so associate companies most of which are wholly owned by CZC. The mines are owned by The Zinc Corporation Ltd. and New Broken Hill Consolidated Ltd. (a 32 per cent CZC-owned company), who operate contiguous mining leases for the production of lead and zinc concentrates at Broken Hill, New South Wales. The principal ore minerals are galena (lead sulphide) and iron-bearing sphalerite (zinc sulphide). In addition, the ore contains silver and minor, but valuable, amounts of copper and cadmium.

In the CZC mines there are six separate lodes containing mineable ore. A lower layer (No. 3 lens) and a higher layer (No. 2 lens) are at present being mined. Typical metal ratios for normal medium grade ore are:—No. 2 lens—13 per cent lead, 3 oz./ton silver, 10 per cent zinc; No. 3 lens—12 per cent lead, 8 oz./ton silver, 15 per cent zinc. The No. 2 lens is the larger orebody and in both properties is the main source of lead lode ore. A typical cross-section of the lead lodes in Zinc Corporation ground would yield about 10,000 tons of ore per foot of horizontal length.

Most of the lead concentrates are treated at the Port Pirie, S.A., smelter of The Broken Hill Associated Smelters Pty. Ltd. (50 per cent CZC owned) for the production of refined lead and silver, sulphuric acid also being made from the sinter gases. The Sulphide Corporation Pty. Ltd. is

erecting an Imperial Smelting process plant, together with a sintering plant, to treat zinc and lead concentrates and this associate company also produces sulphuric acid and fertilisers at Cockle Creek, N.S.W.

Of all other C.Z.C. activities the development of an aluminium industry is by far the most important. The significance of the extensive bauxite deposits on the west coast of Cape York led to the formation in 1956 of the Commonwealth Aluminium Corporation Pty. Ltd. (Comalco) which a year later entered into a three year association with the British Aluminium Co. This partnership was terminated in 1960, however, and C.Z.C. resumed full ownership of Comalco which had in the meantime made considerable progress in planning for alumina and aluminium production based on Weipa bauxite, believed to be the outstanding single deposit of bauxite in the world with proved reserves already in excess of 500,000,000 tons.

At the end of November last year C.Z.C. announced that its shares in Comalco would be transferred to a new Australian company—Comalco Industries Pty.—in which the Kaiser Aluminium and Chemical Company would hold a 50 per cent interest. The new company plans to spend £A.130,000,000 on a development programme including a plant to be erected at Weipa for the production of 360,000 tons of alumina annually and a reduction plant with a 120,000 tons annual capacity to be erected at The Bluff

near Invercargill, New Zealand, using power from the government's Benmore power scheme until the company's power project is completed on the Manapouri-Te-Annau lakes system which offers the cheapest source of power near the low cost alumina of Weipa.

Another important development concerns the Bell Bay plant which is to be operated by Aluminium Production Corporation Ltd. owned by the Tasmanian Government (one-third) and the Comalco Industries Pty. Ltd. Output from this smelter is to be raised from 12,500 tons a year to 28,000 tons and later still to some 50,000 tons.

With consumption of aluminium in Australia growing at a faster rate than that of any other base metal the annual total consumed should exceed 70,000 tons a year by the late sixties and should reach 100,000 tons a year by the early seventies.

Lesser activities include the production of rutile, zircon, ilmenite and monazite concentrates at Stradbroke Island, Queensland, by the Titanium and Zirconium Industries Pty. Ltd.; diamond drilling, geological surveys and mineral search by Enterprise Exploration Co. Pty. Ltd.; oil search by Interstate Oil Ltd. (51 per cent C.Z.C. owned); and management of the Rum Jungle Uranium project for the Commonwealth Government by Territory Enterprises Pty. Ltd. Associate companies also supply the mining operations with electric power, compressed air and timber.

Markets for Southern Rhodesia's Minerals

LAST year the value of Southern Rhodesia's mineral output reached the record figure of £26,434,307 and there are indications that further progress will be made in 1961.

Numerous enquiries from Japanese industrialists for supplies of iron ore have focused attention on the abundant virgin and unexplored deposits in the country, states the Director of Mines in his report for 1960. Contracts varying from 200,000 t.p.a. to 1,800,000 tons are offered by the representatives for ore grading above 60 per cent iron content. The material is not available from current production, however, since the only producer is the Rhodesian Iron and Steel Co. Ltd., who use the ore in their own blast furnaces. All other deposits are held by private individuals or syndicates who either have not the capital or are not prepared to invest the large sums required to bring their deposit to the production stage, preferring to negotiate the outright sale or lease of their properties. The Kobe Steel Works of Japan is the only concern to take up such an offer. At present it is conducting diamond drilling operations at Hunters Road, with the intention of exploring this deposit thoroughly. If the results are satisfactory the ore will be exported to Japan.

An odd situation developed last year in that most of the small chromite producers were forced to cease production due to lack of markets, whereas at least one of the large producers increased sales considerably. In order to help the small producer the question of barter arrangements was considered, but the difficulties were so great that little or no progress was made. Consequently it was thought that the only assistance that could be given was to advertise the advantages of buying Rhodesian chrome.

A promising development was the announcement by Rhodesian Alloys that they intend to start immediately on an expansion scheme at their ferro-chrome plant in Gwelo. It is understood that the expansion scheme will take about two years to complete. The main product of the refinery is low carbon ferro-chrome, all of which is exported.

Considering the weakness of the asbestos market, the result of last year's trading was considered to be as good as could be expected. With the exception of the large groups most producers applied for and were granted remissions of royalty. An outstanding feature of the industry has been the activities of a company operating a factory which blends fibres purchased from a number of mines. Its product has secured a good market in a variety of countries, particularly behind the Iron Curtain. These operations have materially assisted struggling mines and the responsible company has established markets in Poland, Czechoslovakia, the U.K. and India.

The expansion programme at the Kamativi Tin Mine was reflected in last year's record output of 682 tons of tin metal. At present output exceeds the domestic requirement and a considerable quantity is exported to the Union. The report points out, however, that a domestic tinplate industry will undoubtedly develop in the near future.

The industrial growth of Southern Rhodesia has reached the stage where attention is being drawn to the reserves of low priced industrial minerals such as silica, ceramic clays, perlite, felspar, calcite and fluor spar.

The Chief Technical Officer of the Department of Mines visited Australia and Japan over the period Oct. 24 to Dec. 10, 1960, as an official member of a Federal Trade Mission. The prime function of his tour was to investigate the mineral, ore and metal markets in both countries on behalf of the mining industry of Southern Rhodesia and also to study certain mineral processing techniques.

The 1960 Annual Reports of the Director of Mines, Chief Government Mining Engineer, Director of Geological Survey, Secretary, Mining Affairs Board, Registrar of Claims and Minerals Information Bureau are issued by the Southern Rhodesia Government as a single volume (price 10s. 6d.).

The Commonwealth Congress in Retrospect

THE Seventh Commonwealth Mining and Metallurgical Congress opened in Johannesburg on April 10, 1961, and ended in Southern Rhodesia, on May 21, six weeks and some thousands of miles later. The activities of this historic convention ranged over the greater part of a sub-continent. Vast quantities of literature have been taken home by returning delegates (not to mention the tons of rocks collected by enthusiastic geologists), to bear its fruit in the fulness of time. In years to come ideas germinated during Congress will find practical application in the solution of local problems, perhaps in modified form.

Now that delegates have had a chance of sitting back and taking stock, as well as catching up on lost sleep, some kind of composite picture can be put together by collating impressions from various sources, bearing in mind that no single delegate, whether figuratively or literally, could cover more than a portion of the ground embraced by the huge programme.

Notable Feat of Organization

From the comments of homing delegates it is quite evident that the most impressive features of an outstanding Congress have been the efficiency with which everything was organized, from start to finish, and the general kindness and helpfulness of all concerned.

A delegate who spent most of the time in the Union could not speak too highly of the way the tour was organized. The travel arrangements were first-class, he stated, down to the smallest details. An immense amount of trouble had been taken in fixing up the tours and laying on extra ones where numbers exceeded expectations. A special word of praise was accorded to the South African Railways for the excellence of their arrangements, the standards of food and service in the special trains in which delegates lived for several days at a time being of the very highest, as indeed were the general arrangements regarding flights, buses and connections.

Nothing was too much trouble for the organizer and his staff, whose friendly and helpful attitude contributed greatly to the comfort and enjoyment of visitors, both socially and otherwise.

Throughout the tour the hospitality extended to delegates was almost unbelievable. Whereas it may be comparatively easy for the larger operators to serve luncheon for 130 people, this must have meant a lot of hard work for wives of officials at the smaller mines, particularly when they were faced with not one but perhaps three luncheons within a matter of several days. In the circumstances the high standards achieved were particularly meritorious. Delegates were impressed, too, by the efficiency of the arrangements at the more isolated centres, a notable example being the visit to Consolidated Diamond Mines of South West Africa at Oranjemund.

On to the Federation

In Northern Rhodesia, too, delegates could scarcely have met with a friendlier reception. On arrival by air on May 7 they were met by the Governor, Sir Evelyn Hone, and after lunch at Lusaka, were flown to the various mine townships in which they were to stay. There followed an intensive six-day programme which allowed them to follow their own particular interests.

After a strenuous week in Northern Rhodesia some 300 delegates and wives were airlifted from Ndola to various starting points in Southern Rhodesia, and this in itself constituted a record for the Federation in aircraft movements. Finally, all groups converged on Salisbury for a farewell government banquet and dinner-cabaret; unfortunately this function had to be split, since no hall could accommodate the numbers involved. At this memorable gathering Sir Roy Welensky emphasized the absolute necessity for the West to help satisfy the "vacuum" in Africa, while Sir Ronald Paine spoke of the many responsibilities of mining companies in underdeveloped territories.

Technical Impressions

Technically, the accent seems to have been placed on the visits to mines and other tours. The Congress may have suffered to some extent from this approach because of the rather short time allotted to the technical meetings, all of which were well attended. The time available was rationed to 25 min. per paper, of which 10 min. was allowed for the author's introduction leaving only 15 min. for discussion. As the timetable was rigidly followed, this left too short a time for discussion in many cases. Though this does not preclude the submission of written contributions, it would have been an advantage if more time could have been devoted to the technical side, particularly in view of the high standard of the papers submitted, which would be hard to beat. There were so many papers, however, that delegates could do little more than read through those in which they were particularly interested.

The visits to mines provide further confirmation, if such were needed, that Southern Africa is undoubtedly very far advanced in its mining techniques, a dictum which applies, of course, more especially to the major mining fields. One has only to go down the mines to realize how good their planning is, particularly as regards the new mines being developed. Planning, in fact, is now regarded in South Africa as an integral part of development. Delegates were particularly impressed by the magnificent model room at Western Deep Levels, where practically everything is set out in plastics in three dimensions. Eventually there will be a model of the whole mine some 140 ft. long. It is reckoned that this work has saved hundreds of thousands of pounds. The smaller mines, too, are well run, some very efficiently; all have their own particular problems which they have their own methods of overcoming.

Value of Personal Contact

The value of a Congress is apt to be rather an intangible entity, particularly in the initial stages. There may be instances where a delegate notes a new method, takes it straight home and tries it out, or where the host mine is able to pick up a wrinkle or two from the visitors. The benefits, however, become increasingly apparent with time and more especially with the appearance of the bound volumes.

Many believe, however, that the most important benefit of a convention of this nature lies in the personal contacts with opposite numbers who have hitherto been only names. For the making of new contacts, there could, of course, be no finer catalyst than the common theme provided by such a Congress.

Commonwealth Conference—I**DEVELOPMENTS IN THE VALUATION OF GOLD**

THE development of improved methods in the valuation of mining properties from borehole results and more particularly in the assessment of the risk factor in proceeding to exploitation on such evidence, was stimulated by the phenomenal expansion in the gold mining industry in the post World War period. These methods are based almost exclusively on the application of mathematical-statistical procedures first developed by Sichel^{10, 11} and followed by research work in the Mines Department by Ross³ and the author³. Further developments followed^{4, 5, 6, 7} and are still proceeding⁸. The object of this paper is to review these in the light of present knowledge and to suggest an overall framework for the application of these developments to borehole valuation.

Definition of the Problem

The problem of evaluating the prospects of a new mining property from a limited number of borehole results can be broken down briefly as follows:

Estimating the likely average gold value of the area in inch-dwt;

Estimating the net improvement in grade likely to be obtained in mining the ore selectively to a pay limit, and the corresponding percentage of ore to be extracted;

Estimating the likely width over which the ore is to be mined and milled and all the other incidental valuation factors, and from these the likely average recovery grade and the total mill tonnage;

Estimating approximate confidence limits for these grade and tonnage estimates;

Applying the above estimates to a set (or sets) of likely mining programmes and costs for such a property so as to indicate the possible range of returns on the capital investment and also the risk of the investment not being remunerative.

It is obvious, therefore, that this problem requires the assessment of numerous variables, many of which can only be dealt with on the basis of experience and intuition. The valuation of a mining property on this basis can, therefore, never be an exact science and any answer given to this problem must, therefore, necessarily always be a qualified one, particularly in regard to the overall risk faced.

Of all the above mentioned variables the likely average gold inch-dwt value is by far the most important as its estimate is subject to wide limits of error, and it is in this respect that statistical theory can be of considerable assistance.

Basic Concepts in Applying Statistical Methods

In the application of statistical procedures to the valuation of gold mines from borehole results it is essential to realize that the reef sections recovered from the small number of borehole cores represent only an infinitesimal part of the entire ore body. In the Orange Free State field, for example, this fraction was of the order of one part in some 3,000,000,000. Similarly the known borehole values form an infinitesimal percentage of the virtually infinite number of borehole values which could be obtained theoretically by repeated drilling of the same reef area. In statistical theory the available values are termed the "sample" and the infinite number of possible values from which the "sample" is drawn, is called the "population".

The application of statistical theory involves the estimation of the essential characteristics of the unknown population from the known sample with inferences as to the likely errors inherent in the estimate. Thus the available borehole values are used to estimate the average gold value of the reef area concerned with limits of error.

The basic unit of measurement for gold values is the in.-dwt which represents a direct measurement of the quantity of gold per unit area of reef horizon, 80 in.-dwt being equivalent to one ounce (troy) of gold per fathom (36 sq. ft.) of reef.

$$\begin{aligned} \text{1 fathom at the normal specific gravity of 12 cu. ft. per ton} &= \frac{36 \times \text{stoping width}}{12 \times 12} \text{ tons.} \\ \text{Value indicated} = 80 \text{ in.-dwt} &= \frac{80}{\text{s.w.}} \text{ dwt per ton} \times \text{stoping width.} \\ \text{Therefore total gold content} &= \frac{36 \times \text{s.w.}}{12 \times 12} \times \frac{80}{\text{s.w.}} \text{ dwt.} \\ &= 20 \text{ dwt} = 1 \text{ ounce.} \end{aligned}$$

The inch-dwt value for a borehole intersection is arrived at by multiplying the dwt/ton assay value for the reef core by the width of the reef core corrected for apparent dip (i.e., by the indicated normal width or thickness of the ore body).

The essential characteristics of a population of gold in.-dwt. values are represented statistically by the frequency histogram or stepdiagram formed by plotting the frequencies of occurrences of values in the various value categories by rectangles proportional in area to these frequencies and with the respective value categories as bases. The smooth curve drawn through this histogram is called the frequency distribution curve for the population. It has been found that for gold values (as well as uranium and possibly pyrite) in the South African gold mines the various frequency distribution curves are reasonably well represented by a specific type of lognormal curve.

Until recently the straight lognormal model (with only 2 parameters) was accepted as generally applicable to gold value frequency distributions, particularly in dealing with

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GOLD MINING PROPERTIES FROM BOREHOLE RESULTS - I

the values representing large reef areas such as whole mining properties^{3, 4, 5, 8, 9, 10, 11}. In a recent analysis of distributions from a large number of gold mines⁷, the author has shown that there is a regular departure from this model and that although in many cases the straight lognormal model will still be suitable, a modified form is preferable.

Although subject to certain theoretical limitations, tests have shown the practical utility of this modified lognormal model over the full range of conditions likely to be encountered in large South African gold mines and it recommends itself as a relatively simple and effective model.

A typical example of the frequency distribution pattern concerned is depicted for 1,000 individual in. dwt. values selected on a grid from the underground development values at individual sampling sections for the No. 1 and No. 2 Shaft workings of the Merriespruit mine.

Fig. 1 shows the position on logarithmic-probability paper, the curve A being the cumulative frequency curve for the actual in. dwt. values. The corresponding points for the (in. dwt. values + 55) are shown by the filled-in circles, and again the agreement is close between these and the theoretical straight line B, which represents the equivalent of the normal curve for $\log(\text{value} + 55)$ on this figure.

The detailed analyses⁷ for some 24 large mines referred to above have confirmed that this basic pattern persists throughout (also for uranium and possibly for pyrite) with various values for the additive constant being required from mine to mine. Although the differences between the

The article appearing herewith is condensed from a paper presented at The Seventh Commonwealth Mining and Metallurgical Congress convened in Southern Africa. It is one of a series in which papers of particular interest are offered in abridged form

actual distributions and the corresponding theoretical curves could not in all cases pass the customary strict statistical tests, the effective position is that the theoretical model nevertheless proved suitable and sufficiently accurate for all the practical purposes for which it is to be used.

A distinct advantage of the model based on $\log(\text{value} + \text{constant})$ is that estimates of the population mean value framed thereon are evidently not very sensitive to differing values of the constant ranging from close below to well in excess of the optimum figure⁷. It is, therefore, practical for example, to accept this constant at say 60 in. dwt. for the Basal Reef in the Orange Free State field and at, say, 40 in. dwt. for both the Vaal Reef in the Klerksdorp field and for the Kimberley Reef in the Kinross field.

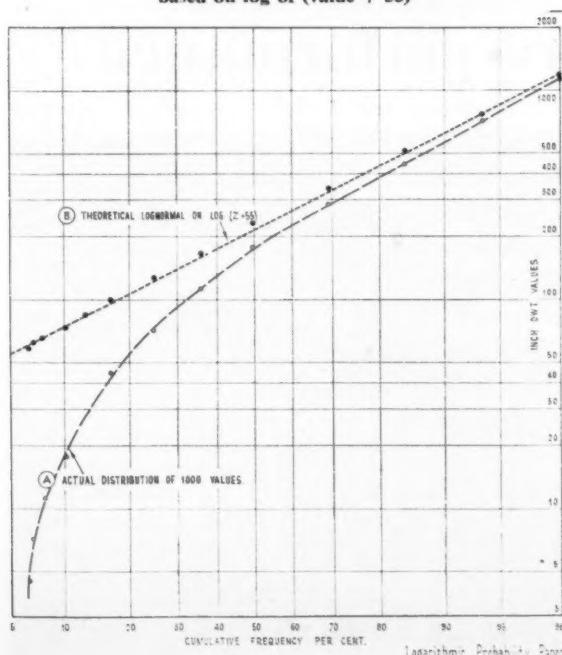
The advantage of using a suitable statistical model in borehole estimates in preference to the orthodox arithmetic mean lies in the fact that the latter accepts only the observed borehole values as obtained whereas the former makes full use of the additional knowledge that such values do follow a typical frequency distribution pattern. With this additional knowledge, it is possible to arrive at an estimate of the average gold value which will be more efficient than the arithmetic (i.e., the statistical estimates will, in the majority of cases, be closer to the actual mean value than the straight arithmetic means). At the same time, this estimate can be qualified by approximate confidence limits.

Estimating the Mean In. Dwt. Value from Borehole Results

Before attempting to estimate the mean in. dwt. value, it is advisable that the borehole results on a property be studied first in conjunction with evidence from adjoining properties to detect any regional value trends. If such trends are clearly evident and indicate that the property can be divided naturally into two or more sections significantly different in value, such a division should be effected first and the different sections dealt with separately as suggested. Such a division should, however, not be effected by a line(s) following tortuous routes between the various boreholes, as this can lead to a serious overestimation of the likely grade.

The second step involves the decision as to whether any values should be rejected as being suspect in relation to the remaining values, for example in cases where there is a reported loss of a portion of the core on the reef waste contact for a friable reef which is known to contain most of its gold on this contact. A general rule to be followed irrespective of subsequent statistical considerations is that all values corresponding to incomplete core recoveries

Fig. 1. Distribution of 1,000 values from the Merriespruit gold mine with the corresponding theoretical lognormal equivalent based on log of (value + 55)





designed for its purpose

Every RB excavator is engineered to give a performance which often sets a standard for its size and capacity. Even so, it is recognised that field experience under varied world-wide conditions can indicate where improvements to specification can be made.

engineered for extra performance

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Full air control of the power raising and lowering type boom-hoist clutches and the ratchet pawl. (Advantageous on lifting crane work where boom luffing is frequently required).

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should be discarded where the responsible geologist reports that the apparent loss is such as to justify such an action.

A study of the core does, however, not always readily allow of a clear decision in such cases and in a recent unpublished paper Heyns² proposed a control system based on the calculated average variance between borehole intersections in the same borehole. This procedure assumes that within the deflection areas of the different boreholes, the in. dwt. values follow the straight lognormal distribution pattern with the same logarithmic variance for each area. The recent paper³ by Rowland and Sichel on sampling control, however, suggests that within such small reef areas the distributions will not all have the same variance, thus calling for the use of a special three parameter distribution which is more leptokurtic, i.e., more peaked than the straight lognormal model.

A detailed discussion of these procedures is not possible in this paper, but the overall control offered is not sensitive as on average as much as 90 per cent of the gold in a core would have to be lost before the control would become effective. It nevertheless provides the only mathematical tool for deciding whether a value is suspect on account of core losses and may also prove extremely useful for drawing attention to possible contamination of borehole cores. As a rough practical guide it may be accepted that any ratio between a pair of in. dwt. values from deflections in the same borehole in excess of say 20 or less than 5 per cent is suspect; similarly ratios over 10 or under 10 per cent call for further inspection.

Having determined the values to be used in the estimate, the normal procedure is to combine the individual deflection values for each borehole so as to deal with only one representative value per borehole. For this purpose the straight arithmetic mean of the values can generally not be improved upon significantly by the use of statistical procedures since the variances within deflection areas are relatively small and the number of values dealt with is also small (usually two or three). Where three or more values are available from a borehole, however, it may prove profitable in specific cases to arrive at a statistical average for the borehole, but without the limiting values shown for the variance as these refer only to mining properties as a whole.

From the set of borehole values thus obtained the statistical estimate of the likely average in. dwt. value for the property is then calculated with approximate limits of error. The resultant estimate will be unadjusted for any bias which may be present in some of the borehole values on account of core losses of varying degrees and will not necessarily correspond to the value likely to be obtained from manual sampling of the reef to be exposed in subsequent development as such sampling is known generally to yield positively rather than negatively biased results¹⁰.

Relationship Between Borehole and Development Results

It is frequently stated that, in general, the development values on a mining property will exceed the estimated value as indicated by borehole results particularly in the case of a narrow friable reef where core losses may be common and oversampling of the reef may occur to varying degrees. As such estimated values based on borehole results are subject to relatively wide limits of error, it is unlikely that this contention can be conclusively tested by statistical methods.

This position is clearly illustrated by the comparisons of development results with corresponding borehole estimates for the Basal Reef in the two sectors of the Orange Free State field and for the Vaal Reef in the Klerksdorp field. In each of the three cases the overall differences in values are not statistically significant, i.e., they can be accounted for by chance. The value indicated by the boreholes for a field as a whole has been exceeded by the development value only in the case of the Vaal Reef in the Klerksdorp field.

These analyses are clearly not conclusive and bearing in mind the nature of such valuations and the need to err, if at all, rather on the conservative side, it is suggested that with the possible exception of properties on the Vaal Reef, borehole estimates be accepted as also representing the corresponding estimates of the likely average sampled grades of the ore to be exposed in development.

For individual mines the position can be summarized as follows :

	Development value higher than borehole value	Development value lower than borehole value
Orange Free State main sector	4	4
Orange Free State, Harmony Virginia sector	1	2
Klerksdorp field	4	1

REFERENCES

- 1 AITCHISON J. and BROWN A. C.—*The Lognormal distribution*—University Press, Cambridge, 1957.
- 2 HEYNS A. J. A.—*A problem in borehole valuation*—Unpublished paper read before South African Statistical Association—1958.
- 3 KRIGE D. G.—*A statistical approach to some basic mine valuation problems on the Witwatersrand*—J. of the Chem. Metall. and Min. Soc. of S. Afr. (Dec. 1951)—discussions and replies March 1952, May 1952, July 1952 and August 1952.
- 4 KRIGE D. G.—*A statistical analysis of some of the borehole values in the Orange Free State goldfield*—J. of the Chem. Metall. and Min. Soc. of S. Afr. (Sept. 1952)—discussions and reply November 1952 and February 1953.
- 5 KRIGE D. G.—*'n Statistiese analise van die vernaamste risiko verbonde aan kapitaal-belegging in nuwe goudmyne in Suid-Afrika*—Tegnikon, Oct. 1955.
- 6 KRIGE D. G.—*A study of the relationship between development values and recovery grades on the South African goldfields*—J. of the S. Afr. Inst. of Min. and Metall., January 1959—discussion and reply April and October 1959.
- 7 KRIGE D. G.—*On the departure of ore value distributions from the lognormal model in South African gold mines*—J. of the S. Afr. Inst. of Min. and Metall.—November, 1960.
- 8 ROSS F. W. J.—*The development and some practical applications of a statistical value distribution theory for the Witwatersrand auriferous deposits*—unpublished Master's thesis, University of the Witwatersrand, 1950.
- 9 ROWLAND R. ST. J. and SICHEL H. S.—*Statistical quality control of routine underground sampling*—J. of the S. Afr. Inst. of Min. and Metall. Jan. 1960—discussions March and May 1960.
- 10 SICHEL H. S.—*An experimental and theoretical investigation of bias error in mine sampling with special reference to narrow gold reefs*—Trans. of the Inst. of Min. and Metall., Lond., Feb. 1947.
- 11 SICHEL H. S.—*New methods in the statistical evaluation of mine sampling data*—Trans. of the Inst. of Min. and Metall., Lond., Mar. 1952.

MINING MISCELLANY

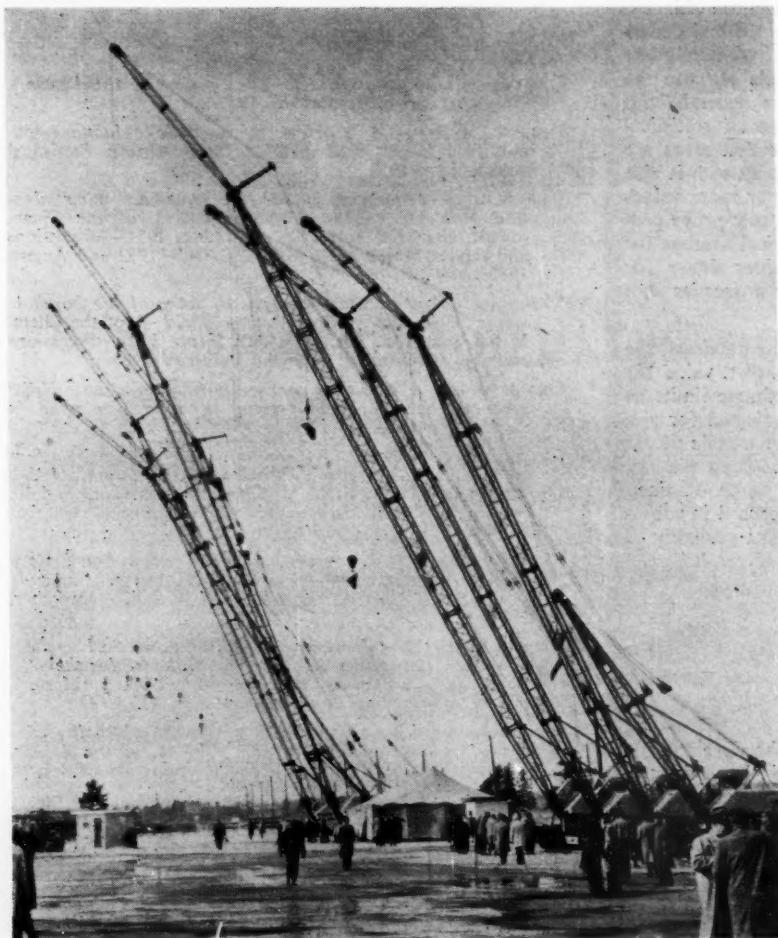
A copper plant with an annual capacity of 10,000 tonnes and a zinc unit producing 15,000 tonnes a year are to be erected in the Indian State of Rajasthan as part of an industrial development project extending over the next two years. A sum of 600,000,000 rupees has been granted for the carrying through of the scheme. The project further covers the exploration of newly-discovered brown coal deposits in the State.

A new company, Belingwe Mining Investments (Pvt), of Southern Rhodesia, with a capital of £25,000, has been formed to exploit high grade iron ore deposits in the Belingwe native reserve. The company has acquired 30 blocks of claims from the Norie Syndicate on a royalty formula basis. These claims, situated 38 miles south of Belingwe, on

the north side of the Bukwa hills, lie only 2 miles from Ngesi railway siding. They embrace scree deposits in which several hundred thousand tons of iron ore at 65 per cent Fe have already been proved. A site is now being prepared for a sorting-washing-crushing-grading plant, costing £20,000 to £25,000, which it is intended to erect immediately. Quarrying operations are to start shortly. It is understood that the output will all go to export, probably mostly to Japan.

Management and technical control of two operating asbestos mines in the Gwanda area of Southern Rhodesia have been taken over by Rand Mines, of the Union of South Africa. The mines, Thornwood and Beta, are owned and operated by M.G. Asbestos (Pvt), whose entire shareholding was acquired last

The intensive "Operation Survival" programme recently called by Harnischfeger Corp., U.S., "to put some snap into America's limping construction and mining equipment business", included part of an afternoon during which the 300 delegates viewed the 1961 P&H line of Fabulous 40 cranes and shovels. Harnischfeger Corp. expects that several new models included in the 1961 line will help spearhead new activity



March by Rand Mines. Rand Mines are also understood to have an option on the Alpha, another asbestos working adjacent to Thornwood and Beta.

Mitsui Bussan Kaisha of Japan have contracted to buy £A8,000,000 of coal from Theiss Bros. from their Queensland coalfield in Australia during the next four years. Theiss are to export 500,000 tons annually to Japan during this period. The quantity is to be increased considerably after the company has built a railway from the coalfield to Gladstone, 330 miles north of Brisbane, which should be completed during 1965.

Island Creek Coal Co., of Pittsburgh, U.S., announce that they are to reopen two West Virginia coal mines, and to step up production sharply at another pit. This should raise the company's coal output by at least 3,400 tons a day, and will bring 145 miners back to work. This is the third production boost announced by the company recently.

A Turkish-French ferro-chrome plant will start operations in the Antalya area of Turkey by the end of 1961. Reynolds Aluminium and another company are also showing interest in Turkish minerals.

Increased world production of manganese coupled with a falling off in world demand, has caused Rhodesian Vanadium temporarily to reduce manganese mining to a minimum in the Fort Rosebery area of Northern Rhodesia, and place the mine on a care and maintenance basis.

Uranium deposits have been found near the town of Erlangen, Bavaria, but it is not intended to exploit the reserves at present, as the Geological Institute of the University of Erlangen believe that they may constitute a danger to the neighbouring village of Zeckern, owing to radioactivity.

The Indian government has decided to expand the uranium mine near Jadugudu, Bihar, and to build a processing plant there. The Jadugudu deposits are India's main source of uranium ore, and the planned expansion should meet the country's future atomic energy demands. A daily ore processing capacity of 1,000 tonnes is planned, the project to cost about Rs. 85,000,000, of which about Rs. 50,000,000 will be spent on extending the mine, and the remainder on the plant.

Lower Saxony produced 12,240,000 tonnes of iron ore in Western Germany during 1960, being 4 per cent above the figure for 1959, which amounted to 11,770,000 tonnes. In 1960, about 59 per cent came from the Salzgitter area, and a further 28 per cent from the Peine-Ilse area. Copper, lead and zinc ore output in Lower Saxony rose by 1.3 per cent over the 1959 level, to a combined total of 590,151 (582,728) tonnes.

New Hosco Mines has finalized a deal with Noranda Mines, providing the funds to make the Hosco Mattagami district copper property ready for production.

Unconfirmed reports place the amount for financing the project at about \$2,800,000. It is further understood that the proposed mill of neighbouring Orchan Mines is to be planned to include treating Hosco ore at a minimum rate of 900 t.p.d. Noranda is to receive a bonus of Hosco shares, and will have management control of the operation until the loan is repaid, when control will revert to Hosco. It is hoped that the property will be producing in late 1962.

★

The Chilean Institute for Geological Research regards the province of Tarapaca as a probable area where important copper reserves might be found. Sites mentioned are El Salar and Santo Domingo, near Arica, and Poricos, Cerro Colorado and Mocha in the Iquique region.

★

The Braden Copper Co. has applied to the authorities in Chile for authorization to invest \$U.S.6,000,000 in equipment, machinery and cash for the expansion of the El Teniente mine, according to the Review of the Bank of London and South America.

★

A new U.S. firm, Metallium Corporation has been formed in New York to develop sources of raw materials for the "new metals, including beryllium, tantalum, columbium and caesium". The firm will implement and co-ordinate prospecting, mining and marketing. Mining engineers will work in South Africa and South America in search of these metal deposits.

★

Congressional approval has been obtained in the Philippines, for a Bill to extend emergency assistance to the gold-mining industry. The Bill extends price supports, by means of subsidies, to gold mines and other mines producing gold as a by-product. Money for the subsidy is to be diverted from taxes which the mines themselves are now paying the government.

★

It is announced from Prague that one of central Europe's biggest magnesite plants is to be erected in Czechoslovakia near the East Slovakian Ironworks combine, at present under construction at Kosice. The works will process rich local deposits.

★

It was reported in Cairo recently that coal deposits, estimated at about 80,000,000 tons, have been found in the Sinai Peninsula. The coal is reported to be of good quality, containing only 8 per cent of ash.

★

The Jordanian Ministry of Trade has decided to start preparations for the exploitation of copper ore in the Wadi district of southern Jordan. In the Jerash area similar preparations are planned for pyrite mining. A sum of £15,000 sterling has been granted for the projects.

★

Russian geologists are exploring for diamonds and gold in Guinea, leading parties of Guineans. Russia is also exporting equipment to Guinea for research centres.

★

The Swiss chemical firm Ciba A.G. reports work on niobium and tantalum metal from ores; research was concerned particularly with the development of sin-



The diesel powered 365 c.f.m. (10.33 m³/min.) oil - cooled mobile rotary compressor unit Air Pumps Ltd. is exhibiting at the British Trade Fair in Moscow. Russian trade officials are reported to have shown considerable interest in this compressor unit when they visited the Raynes Park factory some months ago and the company is hoping to boost British exports to Russia by the exhibition and demonstration of the machine in Moscow

ter anodes for tantalum condensers, with results reported as encouraging. Work on the use of niobium-tantalum compounds as catalysts for the organic chemical industry also proceeded.

★

It is reported from Iceland that Swedish companies are planning to lease the Dettifoss waterfalls in northern Iceland to provide power for an aluminium plant.

★

Under an agreement signed between the Mexican government and Miner Durco S.A. of Mexico, joint exploitation is planned of a large iron ore deposit in the Colima region on the west coast of Mexico. The government would have a one-third participation in the scheme. A government ban would prevent the ores being exported. The deposit is estimated at 1,000,000,000 tonnes and an annual output of 2,000,000 tonnes of high-grade ore is projected.

★

The three iron ore mines of the Ilseder Hütte company of Peine, Western Germany, produced 2,850,000 tonnes of ore, in 1960, compared with 2,760,000 in the preceding year. Respective total tonnage of the three mines per man-shift were 4.64, 4.80 and 12.16. Ilseder ore output rose over the year from 15.1 per cent to 15.3 of total West German production.

★

West German experts, who have been studying Tunisian opencast mining, suggest that copper, lead and zinc plants would warrant erection, and that sand, dolomite and limestone could be used for glass manufacture. It was not decided whether mining the iron ore, which might be used as a basis for a local ferrous metals industry, would be economic.

Gold and silver deposits are claimed to have been located in the Sargofha district of West Pakistan, where Khwaja Mohammad Latif holds a mineral prospecting licence.

★

The Indian bauxite deposits in Katni, in Madhya Pradesh, have been estimated at 4,600,000 tons, compared with the 520,000 tons estimated over a decade ago. Tests carried out in the U.S. on samples of Katni bauxite have indicated the presence of aluminium in greater percentage in the form of alumina trihydrate; production of one ton of alumina, it is estimated, would call for 2.43 tons of bauxite. Bauxite samples from Phulka Pahad in Bilaspur district (Madhya Pradesh) also indicated similar results.

★

Russian prospectors are stated to have found ore deposits, described as important, in the Taiga and Krasnoyarsk areas of Russia. Lead deposits are claimed to be of very high value.

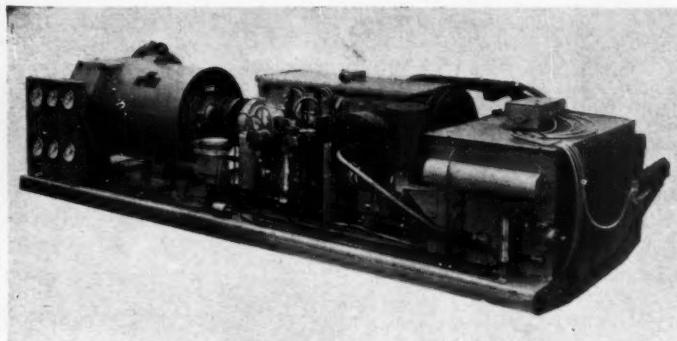
★

Symetain reports figures of output in the former Belgian Congo during last year as : tin ore, 4,227 tonnes; wolfram ore, 75 tonnes and gold, 99.76 kgm.

★

The Council of the City and Guilds of London Institute conferred normal awards, following the usual procedure including the submission of a thesis, on Mr. E. V. Dewhurst (metallurgy), Mr. F. J. Turner (non-ferrous metallurgy) and Mr. K. Wardell (mining surveying) and not special awards for 1961 as stated in *The Mining Journal*, April 28, 1961, p. 493.

THE ARMSTRONG AIRBREAKER SYSTEM . . .

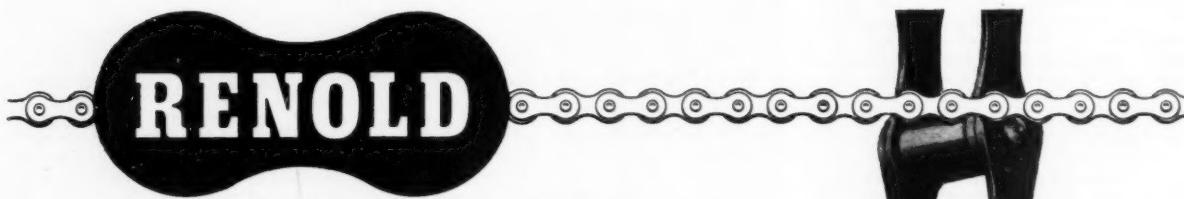


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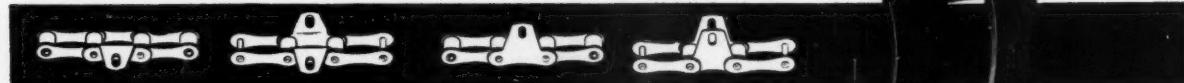
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Machinery and Equipment

New Family of Rotary Excavators in U.S.S.R.

Details have come to hand here of a whole family of rotary excavators in production, or shortly about to be so, in the U.S.S.R., of which the smallest, ERG 350/1000, shown below, can shift 1,300 cu. yd. of earth or ore in an hour.

The rotor, measuring 20 ft. in dia. is lowered by a cantilever crane to the foot of the face to be excavated, and undercuts it in a wide arc, controlled by the movement of the turntable platform. The excavated material falls automatically onto the take-in transporter, which transfers it to the banking transporter, which, in turn, dumps it wherever required. The rotor is lifted after each traverse, thus cutting a new tier, above the one which has just been excavated. The entire excavator is moved forwards as requisite on its caterpillar-tracks.

The next in size of this family, with an hourly capacity of 4,000 cu. yds. is already in construction at a factory in Novo-Kramatorsk, and is expected to be working by the end of this year at the manganese ore field at Nikopol. One still larger, with an hourly capacity of 8,000 cu. yds. is as yet still on the drawing board, but is scheduled for completion in 1963.

It is interesting to note that in *Pravda* of May 17 there is published a photograph of a very similar excavator which has been designed and made in the engineering repair shop at the open-cast brown coal workings at Semenov-Golovkov. Described as having a cantilever reach of almost 33 yds. (30 m.) and an hourly capacity of about 550 cu. yds. (420 cu. m.), it is estimated that its introduction will effect an economy of over 10,000 roubles (£40,000) a year.

LOW ENERGY DETONATING CORD

A new low energy detonating cord that gives a clean, effective break with the minimum of noise, is in use at the Downington limestone quarry, west of Philadelphia, U.S. The quarry is a joint

development by Du Pont and the Ensign-Bickford Co. The development of this new blasting system is presented as an answer to the vexed problem of noise reduction. The problem is a very real one, and applies not only to the U.S., but to any area wherein fast-expanding suburbs are approaching once isolated quarries and opencast mines.

The Du Pont—Ensign-Bickford solution to the noise of blasting has deadened the sound hitherto attributable to the detonating cord that runs above ground, connecting the buried charges. This has always provided the major contribution to the loud noise of blasting.

The new Low Energy Detonating Cord ends the noise factor; Du Pont reports that 150 ft. of it makes as little noise as 2 in. of ordinary detonating cord.

The face blasted at Downington is 58 ft. high and 288 ft. long. The blast cleaned 25,000 tons of spoil. To complete the operation, 16 holes were drilled 18 ft. back from the quarry face. About 535 lb. of explosives were loaded in each hole. "Tovex" gel explosive slurry was used as a bottom load to move the heaviest weight of rock, and "Nitramite" 2 busting agent above as breakage agent.

A double line of Low Energy Detonating Cord was run from hole to hole. At the holes these cords were tied in with special trunkline delay connectors to "Primacord" detonating cord running down into the holes. Through the action of the connectors, each hole was fired 10-15 milliseconds after its predecessor, an action that minimizes vibration. Finally, rounds of powdered limestone were shovelled on top of the connectors to deaden any noise.

Spoil clearance operations take a week, and are completed by a team of trucks, two shovels and a bulldozer.

NEW PUMPING EQUIPMENTS

A portable, pneumatically-operated sludge pump, employing the Venturi principle, that can handle liquids up to

almost tar-like viscosity or with high solid suspension, has been developed by Thor Tools Ltd. The pump has been designed for use in the chemical, mining, quarrying and kindred industries, as well as in general construction work.

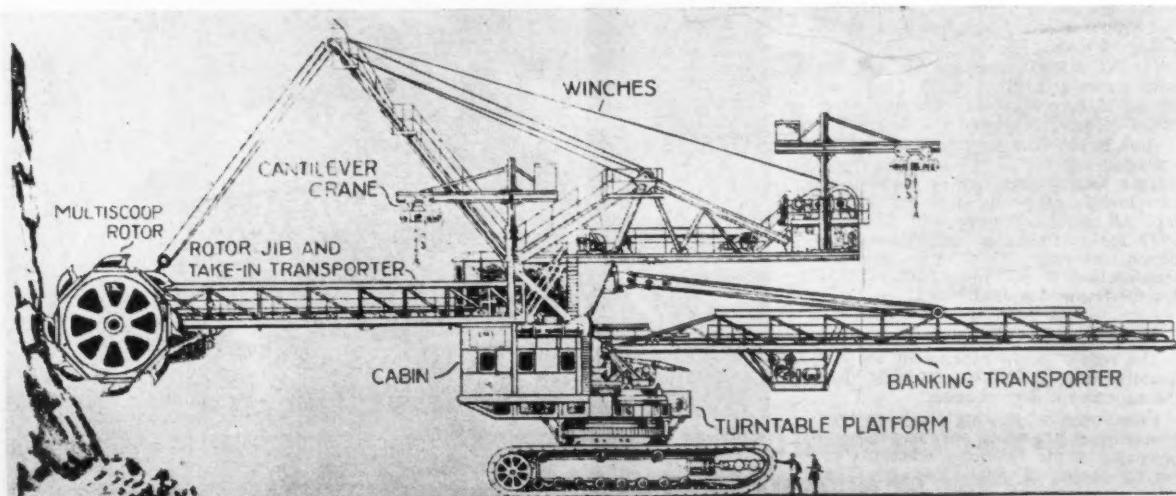
Physical dimensions are height 23½ in., base 18 in. by 12 in., and weight 97 lb., while the capacity of the pump is 36 g.p.m. delivery at a head of 175 ft. using 90 lbs. air pressure at zero suction. With suction hose and foot valve, the Thor pump has an effective suction lift of up to 20 ft., allowing the pump to be suspended above the working area in confined spaces. It can also be used without the foot valve and suction hose when its base is submerged.

The pump is automatically lubricated by means of an air line oiler in which the oil is caught up by the air flow and delivered to the working parts in a finely atomized state. An exhaust silencer is supplied as standard equipment.

New versions of the range of electrically operated vertical spindle self-priming pumps now being produced by Henry Sykes Ltd., for sub-level operation, include improved impeller design and an extensive use of spheroidal graphite iron to eliminate electrolytic effects arising from the use of dissimilar metals for such parts as impellers and wearing plates.

The range, which includes units of 2 in., 3 in., 4 in., and 6 in., suction and delivery, meets a particular demand where it is necessary to keep a sub-level working floor as free as possible of equipment. Thus by mounting the pump at some distance above the floor level, ample head room can be obtained whilst retaining the self-priming characteristic of a high capacity, high lift pump, leaving only a suction hose to sump which may be flexible and light to manoeuvre to any required position.

In these pumps, a totally enclosed fan cooled, weather-proof, high starting torque, low starting current induction motor operating on 400/400 volts, 3



phase 50 cycle supply, is direct coupled to the vertical spindle of a self-priming pump, the self-priming effect being achieved by the re-circulation method. The unit is slung in a cradle formed by the twin delivery branches of the pump which unite above the motor in a flanged Y piece to which may be fitted a gate valve. The pump impeller is of the open type, allowing the passage of slurries of high solids content and the volute is fitted with renewable wearing plates. The shaft is fitted with a renewable, hardened sleeve, and is carried in large diameter ball races.

The capacities of the range extend from that of the VSP2, a 2 in. unit which has an output of 6,000 g.p.h. against a total head from all causes of 90 ft. and 4,000 g.p.h. at 100 ft. to that of the VSP6, a 6 in. pump which handles 50,000 g.p.h. at 70 ft. total head and 30,000 g.p.h. at a 90 ft. total head. The overall dimensions range from a length of 1 ft. 9 in., a width of 1 ft. 7 in. and a height of 4 ft. 9 in. for the VSP2 pump to a length of 3 ft. 4 in., a width of 2 ft. 6 in. and a height of 8 ft. 8 in. for the VSP6 pump. The weights for these two units of the range are 6½ cwt. and 27 cwt. respectively.

A new density gauge manufactured by Saunders-Roe and Nuclear Enterprises Ltd. is intended for continuous recording of the density of material—liquid, solid, slurry, etc.—flowing through a pipe. No contact is made with the contents of the pipe; a unit clamped round its exterior holds a radioactive source and a sensitive photomultiplier so that radiation from the source is measured by the photomultiplier after being attenuated by traversing the pipe. The output of the photomultiplier controls a recorder calibrated to indicate the density of the material in the pipe. An important feature is a fully automatic unit which checks the calibration of the instrument every ten minutes during operation, and makes any necessary adjustments to maintain the standard.

SLIP-RING MOTORS

A new range of slip-ring motors is announced by Crompton Parkinson Ltd. These motors are available in a limited range:

(1) As continuous maximum rating with drip-proof enclosure up to 10 h.p. 4 pole speed, suitable for applications where the use of squirrel-cage motors is not practicable and for operation on 3-phase 50 cycles;

(2) As KRN class, suitable for use with cranes and lifts, ½ hr. or 1 hr. rated up to 15 h.p. 4 pole speed, with drip-proof or totally-enclosed endshields.

Both types of motor can be wound for voltages between 100 and 600 volts. Larger frame sizes are in production carrying the range up to 30 h.p. and 40 h.p. All motors comply with BS.2163: 1957 for performance and have fixing dimensions and shaft sizes as those standardized in BS.2960: Part 1: 1958 for the frame size used.

*

The results of an experiment are frequently more tedious to interpret than the experiment is to conduct.

Faced with a growing result analysis problem—as are many scientists today—physicists at the Thornton, Cheshire, research centre of Shell Research Ltd. have developed a new trace reader.

Equipment Digest

Increased rated-payload capacities of the two largest rear-dump haulers in the Euclid line—Model R-45 to 90,000 lb. and Model R-62 to 124,000 lb.—have been announced by General Motors Corp., Euclid Div., United States. They supersede the 40- and 55-ton rear-dump Euclids. Struck capacity of the R-45 is 30 cu. yd. and for the R-62 40 cu. yd. Use of high-strength alloy steel for all body-wearing surfaces is reported to cut net weight and increase rated payload with no compromise on body strength and durability. It also eliminates the need for bottom plates and sandwich-type construction, but exhaust-heated bodies are retained as standard by using body-stiffener channels as exhaust passages.

*

Use of a new type of polyethylene pipe at the Tralee mine of Allied Chemical's Semet-Solvay Div., U.S., has resulted in a substantial saving in installation time and material cost, according to company mining engineers.

To date, 21,000 ft. of 2 in. polyethylene pipe have been installed for air and water lines. A study shows economies over metal pipe of 5½ per cent in material costs. Mining officials have found the flexibility and continuous lengths of the Orangeburg SP polyethylene pipe to be particularly helpful to workmen when installing pipe in low-height areas. A more recent use of the pipe is for emergency fire fighting because it can be installed in a minimum of time.

*

Many Industrial 'Terylene' products are being shown by I.C.I. Fibres Division on the company's stand at the British Trade Fair, Moscow. With growing emphasis being placed now in the U.S.S.R. on increased productivity and industrial efficiency 'Terylene' might prove of considerable interest in either filament yarn or stable fibre form to Russian manufacturers of industrial fabrics, as well as in imported products from the United Kingdom.

The centre piece of the industrial display is a section of 14 ply super tensile 'Terylene' conveyor belting. This is part of a contract recently received by the Dunlop Rubber Co. Ltd. for 6½ miles of 'Terylene' belting for conveying ores in the U.S.S.R. It is among the strongest beltings ever made. Another type of belting is shown in a model of the Fenner Spacesaver drive. This model illustrates the saving in weight, space and cost which can be achieved by using 'Terylene' belts in place of standard V belts.

'Terylene' is finding increasing uses also in industrial hose. 'Terylene' reinforced hoses made by the Dunlop Rubber Co. Ltd., Bells Asbestos and Engineering Co. Ltd., Compoflex Co. Ltd., Tecalemit Ltd. and B.T.R. Industries Ltd., are included in the display.

Stripping overburden to a depth of 100 ft., at the rate of over 1,700 t.p.h., the W1400 walking dragline at Stewarts and Lloyds Cowthick quarry, Corby, is now nearing the end of its first full year's operation. The Cowthick W1400, designed and built by Ransomes and Rapier, had the largest operating ranges of any walking dragline in the world at the time of its completion. A cross hatching of Cooper and Turner Diadem Agate 600 hard surfacing is applied to protect the bucket and teeth at points of maximum abrasion, at the undersides of the leading edge and between the teeth as shown below. The Agate 600 electrode is a low hydrogen electrode depositing a Cr.Mo. steel in the hardness range 600-700 d.p.m.

which is not changed appreciably by heat treatment



Metals and Minerals

Developments in the U.S. Beryllium Industry

Beryllium is being increasingly used in missile components and nuclear applications where corrosion resistance, heat conductivity, as well as lightness and strength are important.

Last year the U.S. output of beryllium metal is believed to have been in the region of 150 tons worth \$17,000,000. These figures do not include beryllium alloys and beryllia ceramics, demand for which is also mounting. The view has been expressed that the U.S. demand for beryllium metal for aerospace, nuclear, electronic and intermetallic uses could triple in the next few years, provided that the technical and economic obstacles can be overcome. Progress has been reported in reducing the brittleness of beryllium fabricated from powder, but there are other major problems, one being that above 1,000 deg. F. the strength of the metal declines. There is also the question of cost.

In April this year a 15 per cent cut in the price of blend grade beryllium powder was announced by the Brush Beryllium Corp. of Cleveland, Ohio. The other U.S. producer, Beryllium Corp. of Reading, Pa., immediately stated that it would meet competition on the prices of the three leading grades of beryllium powder which it produces at its Hazleton, Pa., plant.

On minimum base lots of 20,000 lb., pure beryllium metal powder blend (200

grade) has been reduced in price from \$64.00 to \$54.00 per lb. The decrease was reported to reflect operating economies resulting from expanded production at Brush Beryllium's Elmore, Ohio, plant, where a \$6,000,000 programme is nearing completion. The capacity of the plant is being raised from 12,000 lb. to 30,000 lb. a month.

The reduction in prices of beryllium powder will be reflected in a further decline in the cost of beryllium products. Last year the average price of fabricated beryllium shapes in the U.S. was \$170 a lb., compared with \$250 a lb. in 1958. This downward trend, which can be expected to continue, should give a further impetus to the expansion of the beryllium metal industry.

Recently it was reported that one, and possibly two, large U.S. companies are planning to start the production of beryllium metal. Lithium Corp. plans to enter this field in association with Alloy Corp., of Boston, Mass., with which it has formed a jointly owned concern, Beryllium Metals' Chemicals. Alloy Corp. has close ties with the Massachusetts Institute of Technology. It has also been announced that beryllium is to be produced by the Vitro Corp.

Beryllium metal is imported into the U.S. by the International Selling Corp., which is partly owned by Pechiney—a

producer of very high purity beryllium—and another French company, Minérais et Métaux. The future for U.S. imports is uncertain, however, one reason being an import duty of 21 per cent. Import prospects could also be affected by the recent 15 per cent cuts in the price of beryllium powder.

Beryllium's future depends not only on overcoming the technical and economic problems associated with the production and fabrication of the metal, but also on the development of economic methods of recovering beryl from low grade deposits.

It has been stated that, except in a few isolated areas, the hand cobbing methods by which practically the entire world supply of beryl is obtained have an efficiency of 40-45 per cent, which could be more than doubled by Beryllium Resources' flotation process, developed by E. Van Dornick and now in pilot plant operation.

U.S. policy is also directed towards reducing the present dependence on imported ores. Last year U.S. shipments of beryl from domestic mines amounted to only 210 s.tons, as compared with imports totalling 8,800 s.tons. The latter were drawn from 13 countries, nine of which are in Africa.

According to Mr. Philip L. Brandon, president of Standard Beryllium Corporation, world beryl consumption was approximately 9,500 s.tons in 1960 and is expected to be from two to three times that amount in 1962. In the latter year Brush Beryllium and the Beryllium Corporation will each be needing 12,000 tons of 12 per cent beryl per year, while

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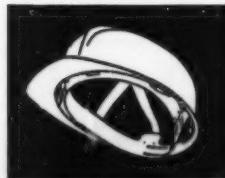


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the annual requirements of Imperial Smelting in the U.K. will be about 6,000 tons. Stronger markets for beryl are probable in future years.

Dr. Norman Williams, vice-president of Beryllium Resources and professor of geology at the University of Utah, is on record as stating that the U.S. domestic supply is good and, if need be, the U.S. could be fully self-sufficient in beryl. At the present rate of consumption Topaz Mountain, one of Beryllium Resources' deposits, could supply the needs for many years. "With a crash programme," said Dr. Williams, "this deposit alone could supply up to 10 or 20 times present demands". By the end of 1961 the company expects to have a 250 t.p.d. mill in operation at Topaz.

Beryllium Resources' was recently reorganized and today Brush Beryllium, Federal Resources Inc. and Hidden Splendour Mining Co. each own 29½ per

cent of the company, the balance being owned by E. Van Dornick.

At the annual meeting of Standard Beryllium in April this year, Mr. Branden stated that, although the company had been founded and has prospered as a buyer and seller of beryllium ore in world markets, its new philosophy was to participate actively in the actual mining of beryl. This new approach was translated into action when Standard Beryllium obtained a 100 per cent interest in Boa Vista in Brazil. Boa Vista contains proved and probable beryl reserves of approximately 350,000 tons on a 1,700 acre site some 200 miles north of Rio de Janeiro. Standard Beryllium is negotiating with Bruce W. Odum and Beryllium Resources to use the Van Dornick processes at Boa Vista, where the process should produce economically 2,500 tons of beryl concentrate per year. Output of the new mill is expected to supply about 15 per cent of the total an-

ticipated increase in the world's consumption of beryl in 1962.

The annual report of American Lead, Zinc and Smelting Co. refers to developments at Mount Wheeler Mines in Nevada, which has been found to contain the beryllium minerals phenakite and bertrandite. It is claimed that these minerals carry approximately three times the percentage of beryllium oxide contained in beryl. Anaconda has an option on 94 per cent of Mount Wheeler's shares.

It was recently reported that mineral rights had been obtained on what was thought to be the first beryl find of consequence in Wisconsin.

*

Aluminium and Magnesium Inc. has disclosed plans to activate the former Brush Beryllium plant at Luckey for the

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recovery of magnesium from about 9,000,000 lb. of government surplus magnesium bombs.

AUSTRALIAN BERYLLIUM RESEARCH

A research contract has been let by the Atomic Energy Commission for the study of methods of recovering beryllia from beryl, it has been announced by the Minister for National Development, Senator W. H. Spooner. The contract for £2,500 has been awarded to the Australian Mineral Development Laboratories of Adelaide. The Commission already has an extensive programme of beryllium research in hand at its Research Establishment, and a building specially designed for the purpose was commissioned last year. In 1957, the Commission instituted a programme of buying and stockpiling beryl produced in Australia. This was in the form of crystals, and the new research contract would throw light on the best means of reducing this material to the forms needed at Lucas Heights and in the power reactors of the future.

AMERICAN METAL CLIMAX OPERATIONS FORECAST

American Metal Climax Incorporated predicts capacity operations for its molybdenum production for the final three-quarters of 1961 with good demand in the U.S. and abroad, D. J. Donahue, Treasurer, told the Cleveland Society of Security Analysts recently.

Mr. Donahue also foresaw a similar situation in potash and an improving situation over the year in all three base metals — copper, lead and zinc. The greatest growth in earnings in the future, Mr. Donahue stated, is likely to come from the Climax Molybdenum Division and the South-West Potash Division or similar areas.

U.S. CUTS URANIUM PRICES

An important move towards making nuclear power plants more competitive with conventional power stations has been taken by the U.S. Atomic Energy Commission. Large price cuts for its enriched and depleted uranium will take effect from July 1.

Prices of enriched uranium will be cut between 20 and 34 per cent and those of depleted uranium between 41 and 63 per cent. Commenting on the price cuts Mr. Glenn Seaborg, chairman of A.E.C. said they would "lower the cost of nuclear power" for both U.S. and foreign operated reactors using U.S. supplied nuclear fuel.

ZIRCONIUM PRODUCTION RISES

American zirconium sponge production last year rose 1,423 s.tons from 1,404 tons in the previous year and was valued at around \$18,000,000. Hafnium output was about doubled at 35 tons. Because of the widening range of uses for zirconium, especially in alloys, the brake on atomic energy developments has not affected demand for the metal.

Last year output of zirconium ingot amounted to 1,345 tons, according to the Bureau of Mines. Production of zirconium oxide, exclusive of oxide produced as an intermediate step in metal production, amounted to 6,907 tons, re-

fractories to 24,862 tons. Ferroalloy output fell 10 per cent from the previous year's level. Ingot consumption held steady at 740 tons. Year-end inventories showed stocks of about 23,000 tons of zircon, 1,400 tons of sponge and 582 tons of ingot. American imports of zircon declined to 34,280 s.tons last year mainly because of a short-fall in shipments from Australia. South Africa and Nigeria shipped 3,133 tons and 1,850 tons, respectively. Hafnium continued to be in good demand.

In Europe the Societe Industrielle du Zirconium has been registered in Paris. It is a French concern with Italian and German as well as French interests. The company is to produce and study present and future uses of the metal, while sales will be carried out directly by the company and through the participating groups.

*

Sirajuddin and Co. of Calcutta have received permission from the Indian government to produce 5,000 tonnes of

ferro-silicon annually. West German interests are ready to collaborate with another Indian company to produce 7,200 tonnes of ferro-silicon annually in India. At present the country's sole producer is the Mysore Iron and Steel Works, with a current output of 5,000 annual tonnes, which will eventually be raised to 20,000 tons a year. It is estimated that by the end of India's third five-year plan, demand for ferro-silicon will have risen to 40,000 tonnes annually.

ZONE-REFINED TELLURIUM

Johnson Matthey announce that they are now producing zone-refined tellurium of high purity. The total metallic impurity content, excluding selenium, is less than 5 p.p.m. and is normally in the region of 1 p.p.m. The selenium content does not exceed 5 p.p.m. The company supplies tellurium as half-round bar approximately 1 in. by $\frac{1}{4}$ in.

Copper • Tin • Lead • Zinc

(From Our London Metal Exchange Correspondent)

With the American market virtually closed for the first two days of the week and with demand continuing on a very hum-drum basis, prices have tended to fall back a little.

COPPER PRICE FALLS BACK

The copper market was subjected to fairly heavy selling at the end of last week and this, combined with rumours which were subsequently confirmed that agreement had been reached at El Teniente and that work had returned to normal at Chilean ports, caused the price to fall back some four pounds after the rise of the last few weeks. At the same time the world structure of copper prices remained unchanged, except that in the U.S. the custom smelters reduced their intake price for scrap by as much as 0.75 c. per lb. but even with this reduction the price of 27.50 c. is still equivalent to copper at 33 c. per lb.

It is understood that most producers are almost sold out for June and that the expectations for July sales are good. The market is now entering a period where rumours with regard to the negotiations between Kennecott and the Unions will play a large part in determining sentiment, and at the time of writing it seems probable that a strike will take place commencing July 1, but experience has shown that it is very dangerous to try and prophesy on such matters.

On the London market turnovers have been well maintained and the contango has shown signs of increasing although stocks remained unchanged at 16,467 tons. The Japanese still remain in the market and it is reported that at the Moscow Fair orders have been booked with British concerns for unwrought copper. Figures issued in America show that during April brass mills, wire mills and foundries shipped 120,676 s.tons of copper to consumers; this was the best tonnage recorded since August 1959. New orders booked in April were equivalent to 131,074 s.tons of copper, the highest since September 1959. On the other hand, fabricators stocks rose by 5,229 s.tons to a total of 453,685 s.tons

after having gone down in the last three months.

WASHINGTON STOCKPILE POLICY STILL OBSCURE

The tin market has remained relatively steady, and the communiqué issued by the International Tin Council after its meeting was less informative than usual. It would appear that agreement with the U.S. Administration on the release of 4,000 tons of tin is proving more difficult than at first anticipated, and at the same time any approach with regard to release from the main stockpile brings up a number of fundamental problems which are better left to be tackled by the second International Tin Agreement commencing on July 1. It would appear that there is little likelihood of any major decisions being made until the first meeting of the new council, which has not yet been fixed. It is assumed that the agenda for the meeting of June 27 will be restricted to matters connected with the changeover from the first to the second scheme. There is a tendency for the contango to widen, although stocks in official warehouses fell by a further 18 tons at the beginning of the week to a total of 9,172 tons.

On Thursday the Eastern price was equivalent to £888 $\frac{1}{2}$ per ton c.i.f. Europe.

WEAKER TREND IN ZINC

The lead market has continued with a very weak undertone although prices themselves showed some signs of recovery during the middle of the week. The contango remains fairly steady, and stocks fell 180 tons to a total of 11,599 tons.

The zinc market has remained fairly steady but it is reported from the United States that in spite of reductions in the premiums for high grade zinc reported recently, these grades are again being offered at a discount, and it can be that this tendency will result in an overall weakening of the price structure. The

contango shows signs of widening and stocks increased by 249 tons to a total of 72,172 tons.

The O.E.E.C. countries lead production in April totalled 58,697 tonnes as compared with 69,629 tonnes in March, and stocks showed a slight increase at the end of the month at 54,868 tonnes as opposed to 53,957 tonnes at the end of March.

Production of zinc in April totalled 78,405 tonnes as compared with 81,819 tonnes in March. End of month stocks showed an increase at 49,267 tonnes as against 44,864 tonnes at the end of March.

In mid-June the United States House Interior Committee is holding a public hearing on lead-zinc legislation, which is confined to subsidies for minor producers of the metals. At the same time the United Nations Lead Zinc Study Group is holding a meeting of the special committee appointed in Mexico City to consider the possibilities of an international agreement for lead and zinc. It is not expected that these deliberations will have any effect on the market, as any proposals will not be considered until the autumn meeting of the full study group in Geneva.

METAL STATISTICS

The British Bureau of Non-Ferrous Metal Statistics figures for March are (in tons) as follows, the February figures being given in parentheses:

Copper consumption	64,765	(55,946)
End of month	118,722	(115,306)
Consumption of tin	2,092	(1,760)
End of month	12,398	(12,076)
Usage of lead	32,601	(30,430)
End of month	73,440	(67,615)

Exports of pig lead in March were more than double those in February, with a large tonnage going to Belgium. Imports were also appreciably higher with arrivals from Australia totalling 16,426 tons against only 4,531 tons in the previous month.

Off-take of zinc	31,844	(28,118)
End of month	62,670	(59,958)

OFFICIAL TURNOVERS

Official turnovers (in tons) for the week ending May 26, with the previous week's figures in parentheses, are:—

Copper	16,125	(18,825)
Tin	695	(1,215)
Lead	7,500	(8,100)
Zinc	6,375	(7,250)

Closing prices are as follows:

	May 25 Buyers Sellers	June 1 Buyers Sellers
COPPER		
Cash	£247	£247½
Three months	£248½	£248½
Settlement	£247½	£240½
LEAD		
Current ½ month	£65½	£65½
Three months	£67	£67½
	£66½	£66½
TIN		
Cash	£869	£870
Three months	£874½	£875
Settlement	£870	£876½
ZINC		
Current ½ month	£82½	£82½
Three months	£82½	£82½

London Metal and Ore Prices appear on page 640.

Mining Finance

Future of Malayan Tin Mining

In his address to the fiftieth Annual General Meeting of the F.M.S. Chamber of Mines the president (reported on page 646), Mr. D. R. Mitchell, has again drawn attention to the problems of the Malayan tin mining industry.

During the past three years the quota restrictions of the International Tin Agreement have masked the fact that Malaya's tin industry is no longer producing at the rate which it was in earlier years. It is anticipated that the output of tin in 1961 will at the most be 55,000 tons, compared with an average of almost 61,000 tons between the years 1954-1957 and over 80,000 tons in the first year of World War II.

Tin provides approximately twenty per cent of the total export value of goods from Malaya which is rather lower than the total value received from the export of rubber. Twenty per cent is in itself a significant single item and a substantial change in this figure would be sufficient to reverse the present favourable balance of trade position.

The falling tin output is due entirely to the shortage of new mining land, which in itself is part of a dual problem. In the first place there is the fact that much of the mining area available is of too low a grade to be worked economically at today's tin price with the high level of government duty. Secondly the land alienation policy prevents the mining of many areas where economic values probably exist.

Low Grade Areas

The working of the lower grade areas is a problem which faces both the government and the industry as a whole. Certainly if the price of tin were to rise over the years due to a persistent shortage these areas would gradually become economic but this presupposes that the higher price will not itself resolve the shortage by accelerating the use of sub-sites.

To make the best use of these deposits the industry must reduce its production costs and the government must adopt a more constructive taxation policy. These are to some extent interrelated problems.

The main scope for reducing costs lies in expanding the scale and mechanization of many of the operations, and in improving the tin recovery, particularly in areas where a relatively high portion of the values are in the fine fraction. The government Department of Mines has helped the industry in this problem of the recovery of the fine fraction and, with the introduction of hydrocyclones for desliming, considerable advances have been made up.

The work that has been done on the introduction of a flotation recovery has, however, proved abortive and thus the emphasis must continue to be on the continual improvement of the gravity methods. In his paper to the Institution of Mining and Metallurgy (Trans. Vol. 70, Part 2, p. 33-76), Mr. F. A. Williams outlined a number of directions for future improvements, many of the recommendations being only minor but the cumulative effect of this type of approach could reduce the average value

at which low grade areas could be profitable by 0.1 lb. per cu. yd.

Tin Export Duty

However, most of these improvements require additional capital expenditure and with the increases in the Tin Export Duty announced in the last budget there is little encouragement for the companies to invest additional capital to work the low grade areas. At present the export duty which is quite independent of the company profits tax works out at a flat rate of approximately 16½ per cent of the total realization value. It is accepted that any government must place a levy on its industries but it is essential that they be imposed with a minimum of hardship and in such a way as to encourage what is in the best interests of the country as a whole, in this case the working of the lower grade deposits. Many other governments have been faced with this problem and have found a suitable solution. Probably one of the best, which might well be suitable in Malaya, is the lease formula payment of the gold mines in South Africa. This formula, also independent of normal profits tax, in fact varies from mine to mine and this is probably an unnecessary complication but in essence it is a taxation based upon the profit margin in relation to the working costs and as such operates as an encouragement to the low grade, high cost worker.

Improved working recoveries together with a constructive taxation policy would increase considerably the number of existing mining areas that could be worked and would also increase the number of old areas that could be re-worked profitably, though this is always bound to be on a selective basis incorporating deeper digging methods as well as simple retreatment.

The question of land alienation is a vexed problem. Each of the nine individual states jealously guards its sovereign rights over land and thus there is no uniform policy for land throughout the country. There have been repeated demands from both industry and the official departments for more prospecting but as in most countries mining competes with agriculture for land. However this competition is not truly at the root of the problem for often sentiment seems to have been allowed to outweigh the economic factors when considering the needs of mining as against agriculture. What is most required is a statewide prospecting survey in order that agricultural policy can determine those areas which can be developed in the knowledge that there will never be any conflict with the mining interest. Equally the country will be able to estimate its mineral wealth and plan a sound policy for land alienation.

This problem has been continually shelved and now that the tin export restrictions have been lifted it is again clear that Malaya's production is falling. The fact that this problem is urgent is emphasized by the fact that the time lag between the early prospecting and first production can often be as much as five years.

(continued overleaf)

Buffer Stock Contributions

With the new International Tin Agreement, Malaya's domestic arrangements for financing her share of the new buffer stock are that the Federal government has arranged to raise a loan through the commercial banks. The amount of this loan, plus the interest, will be recouped by a cess on the export of tin concentrates after July 1, 1961. This will ensure that the individual mine's share of the second buffer stock will be proportionate to its production. The cess will be dependent upon the price of tin and thus the period over which it will be repaid will depend upon the conditions of the tin market, but it is estimated that at the present production and price levels the loan should be repaid in about 2½ years.

This method of financing the new stockpile also means that the mines will be repaid their original contributions fairly soon after the new agreement comes into force. In making their contributions to the previous buffer stock the mines were given the opportunity to opt whether to regard the contribution as a deductible expense for taxation purposes, in which case the repayment will be taxable in the year that it is received, or alternatively to pay tax on the contribution at the time in which case it will now be received tax free.

PROSPECTS FOR CONSOLIDATED ZINC

Mr. L. B. Robinson's speech accompanying the 1960 annual report of the Consolidated Zinc Corporation is a long and detailed one covering as it does the many and widespread activities of this

large mining group. But there is one notable omission. Mr. Robinson has nothing to say about future earnings and dividend prospects. Some guidance on this point would almost certainly have been welcomed by shareholders especially as such prospects are particularly difficult to assess at the present juncture in the group's affairs.

When commenting on the preliminary figures here on May 5 we concluded that it would be the industrial aspects of the corporation's activities, not the mining side, that would have accounted for the rather disappointing setback in earnings last year. This proves to be the case. Mining of lead and zinc, with the accent on the latter, resulted in a substantial increase in profits, a rise that could be deduced from the experience of New Broken Hill, the associated company in which a 32 per cent interest is held. Higher dividends from this company and also from British Titan Products helped investment revenue.

On the other side of the picture, improved trading profits from zinc smelting at Avonmouth and from sulphuric acid were more than offset by heavy expenses incurred at Swansea through the change-over there to the new Imperial Smelting furnace. There was also a decline in the earnings from pigments due to competition and lower profit margins and some loss on writing down stocks. U.K. trading results were thus substantially lower than in 1959.

What can be deduced about the outlook from all this? For one thing there should be the benefits this year from the new Swansea plant without the change-over expenses. The new sulphuric acid plant at Cockle Creek in Australia was commissioned in November and the new

lead and zinc smelter there, another Imperial Smelting plant, is due to start up about the middle of the current year. Consolidated Zinc now has a 75 per cent interest in Sulphide Corporation which runs these plants, 25 per cent having been sold to New Broken Hill last December. That concern will supply the major part of the lead and zinc concentrates to the new plant.

On the mining side there have been lower lead and zinc prices to date compared with the 1960 averages. Mr. Robinson goes deeply into the future of these metals. He is quite confident about zinc, but sees the outlook for lead as problematical. In any event, Consolidated Zinc should be getting more from its New Broken Hill stake in 1961.

It is permissible to deduce from all this that the corporation should have another quite good year providing there is no fresh setback in the metal prices. But here we come to the factor that is going to dominate Consolidated Zinc's finances for a good few years to come. This is the huge Australian and New Zealand aluminium project, the first stage of which is due to come into operation by mid-1966. It will naturally entail very substantial capital expenditure. The American company, Kaiser Aluminum, has a half share and the British South Africa Company is putting up £10,000,000.

Even so, one cannot help feeling that the need for providing funds may well make for conservative distributions by the corporation in the next few years. It will help, of course, if metal stocks can be run down. They account for no less than £11,496,850 of the current assets figure of £17,171,029 in the 1960 balance sheet. Negotiations are going on with the U.S. government for the barter of surplus lead stocks to that country.

Consolidated Zinc £1 shares stand at 77s. ex dividend to yield 5.2 per cent on the unchanged 4s. payment for 1960 which was covered 1.7 times by consolidated earnings. They have an undoubtedly substantial long-term growth element in them, but the accent is on the long-term. A lock-up for the patient must be the verdict.

Mr. Robinson's statement is reported on page 648, while a brief historical review of the company's development appears on page 623.

NEW BROKEN HILL DOES WELL

New Broken Hill relies virtually entirely on its lead-zinc mining operations for its earnings and, as detailed here on May 5, it had a very good year in 1960 and stepped up its dividend by 9d. to 3s. tax free. In accordance with group policy the company put its products emphasis on zinc with a consequent rise in zinc concentrate produced from 128,416 tons to 147,731 tons and a fall in lead concentrate output from 88,987 tons to 72,006 tons. Here again out of current assets of £3,363,771 stocks of metals and concentrates at cost account for £1,666,380, so any running down of these stocks that can be effected through barter deals with the U.S. will help the company's liquid position.

The profit prospect for 1961 is clouded to some extent by lower metal prices. Against this the yield on the 5s. shares at 50s. 3d. ex dividend is the quite reasonable one of 9.7 per cent.

Chairman's statement appears on page 648.

LONDON METAL AND ORE PRICES, JUNE 1, 1961

METAL PRICES

Aluminium, 99.5% £186 per ton
Antimony—
English (99%) delivered, 10 cwt. and over £230 per ton
Arsenic, £400 per ton
Bismuth (min. 1 ton lots) 16s. lb. nom.
Cadmium 11s. 0d. lb.
Cerium (99%) net, £15 0s. lb. delivered U.K.
Chromium Cr. 99% 6s. 11d./7s. 4d. lb.
Cobalt, 12s. lb.
Gold, 99.99% Ge. kilo lots 2s. 5d. per gram
Gold, 25s. 4d.
Iridium, £20/£23 oz. nom.
Lanthanum (98%/99%) 15s. per gram.

Magnesium, 2s. 2½d./2s. 3d. lb
Manganese Metal (96%/98%) £275/£285
Nickel, 99.5% (home trade) £600 per ton
Osmium, £18/£22 oz. nom.
Osmiridium, nom.
Palladium, Imported, £8 12s. 6d.
Platinum U.K. and Empire Refined £30 5s.
Imported £28/£28½
Quicksilver, £67 ex-warehouse
Rhodium, £43/£45 oz.
Ruthenium, £14/£16 oz. nom.
Selenium, 46s. 6d. per lb.
Silver, 79½d. f. oz. spot and 80d. f.d.
Tellurium, 37s. 6d. lb

ORES AND OXIDES

Antimony Ore (60%) basis .. .	.. .	.. .	30s. 0d./35s. 0d. per unit c.i.f.
Beryl (min. 10 per cent BeO) .. .	.. .	.. .	270s. 0d./275s. 0d. per l. ton unit BeO
Bismuth .. .	.. .	.. .	65s. 8s. 6d. lb. c.i.f.
Chrome Ore—			18/20s. 1s. 3d. lb. c.i.f.
Rhodesian Metallurgical (semifriable 48%) (Ratio 3 : 1) .. .	.. .	.. .	£15 5s. 0d. per ton c.i.f.
" Hard Lumpy 45% .. .	.. .	(Ratio 3 : 1)	£15 10s. 0d. per ton c.i.f.
" Refractory 40% .. .	.. .	.. .	£11 0s. 0d. per ton c.i.f.
" Small 44% .. .	.. .	(Ratio 3 : 1)	£13 5s. 0d. per ton c.i.f.
Baluchistan 48% (Ratio 3 : 1) .. .	.. .	.. .	£11 15s. 0d. per ton f.o.b.
Columbite, Nigerian quality, basis 70% combined pentoxides (Ratio 10 : 1) .. .	.. .	Nb ₂ O ₅ : Ta ₂ O ₅	165s. 167s. 6d. per l. ton unit c.i.f.
Fluor spar—			
Acid Grade, Flotated Material .. .	.. .	.. .	£22 13s. 3d. per ton ex. works
Metallurgical (75/80% CaF ₂) .. .	.. .	.. .	156s. 0d. ex. works
Lithium Ore—			
Petalite min. 34% Li ₂ O .. .	.. .	.. .	50s. 0d./55s. 0d. per unit f.o.b. Beira
Lepidolite min. 34% Li ₂ O .. .	.. .	.. .	50s. 0d./55s. 0d. per unit f.o.b. Beira
Amblygonite basis 7% Li ₂ O .. .	.. .	.. .	75s. 85s. per ton f.o.b. Beira
Magnesite, ground calcined .. .	.. .	.. .	£28 0s./£30 0s. d/d
Magnesite Raw (ground) .. .	.. .	.. .	£21 0s./£23 0s. d/d
Manganese Ore Indian—			
Europe (46%-48%) basis 60s. 0d. freight .. .	.. .	.. .	73d./75d. c.i.f. nom.
Manganese Ore (43%-45%) .. .	.. .	.. .	69d./71d. c.i.f. nom.
Manganese Ore (38%-40%) .. .	.. .	.. .	8s. 11d. per lb. (f.o.b.)
Molybdenite (85%) basis .. .	.. .	.. .	£244 per ton c.i.f. Aust'n
Titanium Ore—			
Rutile 95/97% TiO ₂ (prompt delivery) .. .	.. .	.. .	£11 10s. per ton c.i.f. Malayan
Ilmenite 50/52% TiO ₂ .. .	.. .	.. .	120s. 6d./125s. 6d. per unit c.i.f.
Wolfram and Scheelite (65%) .. .	.. .	.. .
Vanadium—			
Fused oxide 95% V ₂ O ₅ .. .	.. .	.. .	7s. 6d./8s. per lb. V ₂ O ₅ c.i.f.
Zircon Sand (Australian) 65-66% ZrO ₂ .. .	.. .	.. .	£16 ton c.i.f.

UNION MINIERE STILL PROGRESSING

At the meeting of Union Minière du Haut-Katanga in Brussels, reported on page 645, the chairman of this big Congo copper producer, Mr. Paul Gillet, confirmed recent reports from Belgium that only half the final dividend of 900 francs a share is to be paid from May 26 onwards. When the other half will be paid will be decided by the Board at a later date. Presumably this unusual decision has been reached owing to difficulties in getting the necessary funds out of the Katanga Province of the troubled Congo.

Actually, the Congo troubles last year only upset the life of the company for two or three days and have not stopped it from bringing in new plant, the second section of the Lulu plant (capacity 50,000 tons of copper per annum) came into operation in March of the current year and the Kambove concentrator with a capacity of 720,000 tons of ore per annum was brought in the following month. Aggregate copper production last year was some 20,000 tonnes higher at 300,675 tonnes and there was a slightly increased selling price. The company will have been getting a lower price in the present year to date compared with the 1960 average, but Mr. Gillet points out that an improvement in copper prices is showing itself at present owing to a reduction of stocks and to an increase in deliveries to the industry. This enables the future of the copper market to be viewed with "a certain optimism".

Tanganyika Concessions relies to a large extent on the income from its holding in Union Minière for its earnings. It is notable that the decision to pay the Union Minière final in two halves has not prevented "Tanks" from recently

maintaining its interim dividend for the year to July 31 next at 1s. 6d. Its revenue from Union Minière for 1960-61 will, however, be lower because that concern's total payment for 1960 at 1,500 francs was a reduction of 700 francs on the 1959 total. "Tanks" final for 1959-60 was 2s. 3d. Present price of the 10s. units is 22s. 3d.

KINROSS SPEED-UP

The annual statements by the chairman of the South African gold mines in the Union Corporation group have a number of points of interest affecting the future of these concerns. Bracken, the developing mine in the new Kinross gold field, reckons to start trial milling in about twelve months' time with official production at the end of 1962 or early in 1963 which would be about six months ahead of schedule. Similarly, its neighbour Leslie should if all goes well, start trial milling about the middle of next year with official production in the first half of 1963, which would also be a gain of some six months compared with the forecast in the original prospectus.

Leslie now estimates that it will take around £9,600,000 to get the mine to the stage when further capital expenditure can be financed out of earnings, which would be a saving of about £600,000. The companies have arranged for loans of £1,000,000 apiece from the National Finance Corporation of South Africa in order to complete their financing arrangements.

Leslie may announce its first limited development footage for the current quarter. Bracken has already started opening up the reef. Up to mid-May 1,390 ft. sampled had given 81 per cent payability averaging 443 in. dwt. In accordance with Union Corporation

practice these results are reached after applying a discount for ore reserve purposes.

Mr. C. B. Anderson, chairman of the group's highly successful O.F.S. gold producer St. Helena, said that, although it would be most unwise to attempt any predictions about the course of dividends in the years ahead, it should be possible to maintain the 5s. rate in 1961. This forecast is in line with expectations, but it is reassuring to hear it from the chairman in view of the sudden and heavy impact of tax in the current year. In the March quarter the government was syphoning off over 50 per cent of the gross profits, although the initial liability in this respect did not come into being until the last three months of 1960.

As regards the older mines, Mr. M.W. Richards, chairman of Geduld Proprietary, which is in the course of turning itself into an investment company, said that while it was not possible to predict how long actual mining operations could be carried on profitably "it was possible to see at least a year ahead".

See pages 642-645.

RAND MINES EARNS LESS

The profusely illustrated Rand Mines report shows that this mining finance concern in the Central Mining orbit made a lower profit of £1,326,648 last year compared with £1,545,711 in 1959, higher dividend income being offset by an understandable falling off in profits from investment realization which dropped from £379,516 to £115,640. Last year's poor share market is likewise reflected in a fall of rather over £2,500,000 in the Stock Exchange value of quoted investments to £14,591,635, which is, however, still comfortably above the book value of £9,211,449.

As previously announced, the dividend is maintained at 6s. per 5s. share, and is covered 1.5 times by available earnings. A recovery in market profits in 1961 looks to be doubtful at the moment despite the present rally in Kaffirs, but there seems to be no reason, other than a racial upheaval, why there should be any falling off in dividend income. It is fairly certain that the American chairman of Rand Mines, Mr. Chales W. Engelhard, will give an opinion about prospects at the meeting on June 19. Meanwhile, the shares at 72s. 6d. offer a yield of 8.3 per cent without allowing for double tax relief.

NOTICE: Applications for the exploitation of Hofrat En Nahas Copper Mine are invited by the Sudan Government. The explored area proved to contain more than ten million tons of ore with average copper content of 2.78. More details can be obtained from the Sudan Embassy, 3 Cleveland Row, London, S.W.1.

London Market Highlights

The latest boomlet in South African Gold shares gathered pace this week when it became clear that the African stay-at-home campaign flopped. Johannesburg remained in a buying mood and London prices were again widened and adjusted upwards. The Rand devaluation idea began to recede but arbitrageurs still moved cautiously, operating only when the margin between prices here and at the Cape became temptingly wide. The theory behind the Cape buying was that an investor there really had little to lose. If the dreaded racial clash occurred it would not make a great deal of difference where one's money was kept, whether in Kaffirs or in the bank. And if the South African government was forced to clamp on severe currency controls in order to combat the serious loss of reserves this would halt the supply of overseas stock to Johannesburg with the result that prices would rise in that centre as the floating supply of shares there dwindled. South African holders would also be covered in the event of a Rand devaluation, but such a move was considered unlikely for the reason that it would not provide the answer to the Union's loss of reserves.

London investors, on the other hand, stood to gain little from an entry in the Kaffir market at this stage. The risks both political and financial still outweighed the capital gain possibilities, it was considered. There was, of course, the usual small band of intrepid specu-

lators here. But they found that stock was particularly short in London and it was not easy to deal satisfactorily.

Upward price movements in London were substantial and out of all proportion to the actual amount of business passing. Among them Western Holdings advanced 10s. to 126s. 3d. at one time before later returning to 125s., Free State Geduld rose 8s. 9d. to 95s., Anglo American put on 10s. to 132s. 6d. and in the Diamond group De Beers gained 11s. 3d. to 136s. 3d.

While all this was going on other sections of the mining share market moved fairly narrowly for the most part. The feature of the copper share group was British South Africa (Chartered) which moved up 4s. 6d. to 63s. 6d.; the rise was, however, largely inspired by the recognition of the company's important gold interests.

Tins fluctuated rather indecisively. Gopeng (44s.) failed to make much response to the annual report. But Ampat jumped 2s. 9d. to 18s. 9d. on the rise in profits and dividend plus the proposed capital return. Siamese (18s. 6d.) were also a firm spot on their encouraging results.

Elsewhere, Central Provinces Manganese made a good recovery to 20s. after the recent setback which has followed news of difficulties with the Indian government regarding the renewal of some of the company's leases.

The manufacturers of "Trio" Expanding Roof Bolts at present being used extensively by mines all over the world for safe, reliable, inexpensive roof support, are desirous of extending their exclusive agencies in all overseas territories. Details from S.A.P.I.M.A. (Pty.) Ltd., 6 Bloomsbury Square, London, W.C.1.

ST. HELENA GOLD MINES, LIMITED

Mr. C. B. Anderson, the Chairman of the Company, in addressing members at the Annual General Meeting held in Johannesburg on May 26, 1961, said that in 1960 the tonnage milled increased by 194,000 tons to 2,004,000 tons the yield improved by 0.67 dwt. to 6.84 dwt. per ton and there was an increase of 1s. 4d. per ounce fine in the average price received for gold. As a result, the working revenue increased by over £1,627,000 to £8,612,487. Working costs were 4d. per ton milled higher at 42s. 11d. per ton and totalled £4,303,562, leaving a working profit of £4,308,925. Much of the improvement in the yield was due to the contribution of higher grade ore from development and stoping in the No. 2 Shaft area which, during 1960 accounted for just over twenty-five per cent of the fathoms mined and over 70 per cent of the total payable development footage.

After taking into account sundry revenue and expenditure and providing £47,076 for taxation the net profit was £4,244,206. Capital expenditure was substantially lower than in recent years and absorbed £581,458. An amount of £6,000 was set aside for European leave pay and two dividends, totalling 5s. 0d. per share, or 2s. 0d. per share more than in 1959, were declared and absorbed £2,406,250 so that the balance carried forward was increased by £1,250,498 to £2,249,760.

Development and Ore Reserves

The total development footage driven within the lease area during 1960 was 85,101 feet of which 28,890 feet was on reef and sampled and 16,495 feet, or 57 per cent, proved payable, averaging 700 inch-dwt. Compared with 1959 there was an increase of 3,770 feet in the payable footage but the average inch-dwt. figure was 69 inch-dwt. lower. Of the total footage on reef and sampled, development in the newer area of the mine served by No. 2 Shaft accounted for 17,680 feet and this disclosed 11,550 feet, or 65 per cent, to be payable averaging 809 inch-dwt.

A further 2,396 feet was developed in the Thereonia Prospect Area but only marginal values were disclosed.

At December 31, 1960, the ore reserves were estimated to amount to 5,000,000 tons having an average value of 8.0 dwt. per ton over an estimated stoping width of 56 inches. Compared with the previous year there was an increase of 1,000,000 tons in the tonnage and 0.5 dwt. in the average value while the estimated stoping width was one inch higher.

Water

While the quantity of water pumped from underground increased somewhat during the year to over 1,102 million gallons, indications were that the effect of opening up the lower levels of the mine had been to drain the upper levels. The bulk of the No. 4 Shaft workings were now dry, the water table having been lowered over the years from about 500 feet below surface to below 10 level which lies some 2,430 feet below surface. The mine now had ample reserve storage and evaporation capacity on surface to handle the large quantities of water that were still being pumped.

Drilling From Surface

In order to assist future planning and development a programme of diamond drilling from surface had been instituted during the year. Most of these boreholes were drilled in the shallower portions of the lease area with a view to exploring further the anticline which lay to the west of No. 4 Shaft, and elucidating structures. In addition, two boreholes, S.H.21 and S.H.22, the latter some 8,000 feet south-east of No. 4 Shaft, had been drilled in the south central portion of the lease area, to the east of the present workings. No further boreholes would be drilled in this region for the time being because the area would shortly be explored by underground development headings from No. 2 Shaft.

No. 2 Shaft Area

Very heavy faulting hampered development to the north of No. 2 Shaft and 15, 16, 17 and 18 Level North Drives had all been stopped approximately 1,000 feet from the Western Holdings' boundary because faulting had resulted in these levels being off-reef with little prospect of getting on to reef again. The Chairman said that this was disappointing because the reef on these levels, where encountered, usually carried high values. Fortunately there was little disturbance through faulting elsewhere at No. 2 Shaft. 22 and 23 Levels South were being developed on a treble shift basis to effect a hoisting to No. 7 Shaft workings. Both these ends had now passed beneath 18 East Haulage.

No. 7 Shaft

No. 7 Ventilation Shaft reached its final depth of 5,338 feet in June 1960 and by the year-end the brattice wall dividing the shaft into equal up- and down-cast compartments had been completed and proved airtight and the temporary fans had been installed. The whole scheme had been completed in just over two years from the start. With the commissioning of No. 7 Shaft the mine was up-casting to surface about 1,500,000 cubic feet of air per minute through seven shafts and winzes. At the present rate of production this was equivalent to over 11 tons of air for every ton of ore milled. It was planned to increase the total of up-cast air in this system to over 2,000,000 cubic feet per minute.

President Brand Boundary Area

18 East Haulage reached the up-thrown block of reef on the President Brand boundary towards the end of 1960 and a start had been made with development in this area on 17 East and 18 East Levels. Due to the necessity of establishing proper layouts for the large 20 ton hoppers which would be used in 18 East Haulage most of this development had so far been off-reef but up to the end of April 1961 a total of 1,645 feet had been on-reef and sampled disclosing 1,140 feet or 69 per cent payable at an average of 677 inch-dwt. Too much significance should not be attached to this comparatively small amount of on-reef footage.

Future Outlook

Mr. Anderson reminded members that he had mentioned the previous year that further shafts would be necessary fully to exploit the remainder of the lease area, but there was no immediate programme of major expansion or shaft sinking requiring provision for heavy capital expenditure. As against this, however, during 1960 the Company became liable for Formula Tax and it would become liable during 1961 for the first payment of Government's share of profits. The provision for Government's share during 1961 would not be substantial due to the effect of accumulated capital allowances but since these would be absorbed by profits during 1961, the full amount of the Government's share would be payable from 1962.

Because of the heavy taxation and lease payments from 1961 onwards and the need to provide some kind of cushion against these it had been felt prudent to build up the substantial balance of unappropriated profits reflected in the Balance Sheet. The rate of future dividend distributions largely depended on the grade of ore sent to the mill and in this connection Mr. Anderson pointed out that while development in the No. 2 Shaft area was making good progress and giving encouraging results there were large areas still untested and work had only just started in the up-thrown strip adjoining the President Brand boundary. Accordingly, it would be most unwise to attempt any predictions about the course of dividend distributions in the years ahead. It should be possible during 1961, however, at least to maintain dividend payments at the same rate as in 1960.

A member asked what effect the Dagbreek fault would have on the claim area adjoining the President Brand boundary, what was the dip of the fault, when was the mill likely to handle 200,000 tons per month and was there any change in the distribution of ore reserve values above and below the 8 to 12 Level fault as compared to those given last year.

The Chairman replied that it was not possible at this stage to state exactly the loss of the claim areas as the result of the Dagbreek fault which appeared to dip at about 45 degrees. The reduction plant was able to mill 200,000 tons per month but the mine was not in a position to produce the ore yet. Insofar as the distribution of ore reserve values was concerned the figure was not immediately available but there was probably not much change.

Another member asked why the rise in the value of the ore reserves was so small in relation to the value of the development footage carried out during the year.

The Chairman replied that the ore reserve was calculated over an estimated stoping width which was the minimum width that could be stoped. The development values were taken over the actual channel width sampled and additional ore at much lower value was brought into ore reserves as stoping proceeded.

Another member asked why there was a difference of nearly 1 dwt. between the value of the ore reserves and the yield per ton milled.

The Chairman replied that the difference was due to no surface sorting being possible and to a high proportion of development ore.

A member asked what was the estimated tonnage which would be drawn from No 2 and No. 4 Shaft areas for this year.

The Chairman replied that for the year 1960 25 per cent of the fathomage mined was in the No. 2 Shaft area and that this would increase to about 35 per cent in 1961.

In reply to a question by a member regarding current development in the north-western area of the property and the number of boreholes at present being drilled in the lease area the Chairman replied that development for the first quarter had been published. Insofar as the Thereonia Prospect Area was concerned only marginal values had been disclosed. Only one borehole was at present in progress in the western part of the lease area.

A member asked whether the Chair-

man could supply an estimate of the capital expenditure for the current year.

In reply the Chairman stated that the capital expenditure for this year would be small. A shaft would have to be sunk eventually in the south-eastern portion of the Company's property but as yet no plans had been made for it.

In reply to a member who urged that the Company should issue the Chairman's Statement with the Directors' Report, the Chairman replied that the practice followed by the Company in giving information to members in an address at the Annual General Meeting had certain advantages.

The Report and Accounts were adopted.

The retiring Directors, Messrs. P. H. Anderson, A. Royden Harrison and S. Spiro were re-elected.

of providing a temporary supply of potable water had served the Company and Evander Township very well.

In view of the planned expansion of operations at Winkelhaak itself and the opening up of the properties of Bracken Mines, Limited and Leslie Gold Mines, Limited and the consequent substantial increase in the population of Evander Township it had been felt that the time had come to establish a permanent water supply for this goldfield. Accordingly, last year an agreement had been concluded with the Rand Water Board whereby the Board would make available to the four Companies concerned a supply of 2 million gallons of water per day and for this purpose would lay a pipeline from the Board's Selcourt Reservoir near Springs to a central service reservoir near Leven Siding with the necessary branch pipelines. The cost of the scheme, including interest on capital, would be recovered by the Board from the four companies concerned over a period of twenty years through charges for the water supplied.

Excellent progress was being made and it now seemed possible that water from this source would be available within the next twelve months.

WINKELHAAK MINES LIMITED

Mr. T. P. Stratten, the Chairman of the Company, in addressing members at the Annual General Meeting held in Johannesburg on May 26, 1961, said that during 1960, which was the Company's second full year of production, the tonnage milled increased by 157,000 tons to 1,065,000 tons, the average yield improved by 1.29 dwt. to 6.47 dwt. per ton, the average price received for gold was 1s. 4d. per ounce fine higher and working costs were reduced by 3s. 5d. per ton to 48s. 7d. per ton milled. The result of this combination of favourable factors was that compared with 1959 the working profit increased by over £1,167,000 to £1,755,307.

After deducting £60,277 for payment of interest on loans — principally the £1,000,000 loan from the National Finance Corporation—and after taking into account the other items of income and expenditure the profit for the year was £1,700,333. From this profit £1,465,000 was transferred to the reserve for expenditure on fixed assets, £7,600 was set aside as a provision for European leave pay and a maiden dividend of 4d. per share was declared in September last and absorbed £200,000. This left £27,733 to be added to the balance of unappropriated profit which at the year-end stood at £236,286.

Development and Ore Reserves

The Chairman said that the total development footage accomplished during 1960 at 57,119 feet was slightly lower than in 1959 but the amount of payable footage, the percentage payability and the average value were all somewhat higher. 23,585 feet was on reef and sampled, disclosing 20,665 feet or 88 per cent to be payable, averaging 535 inch-dwt. Encouraging features of the year's development work were the good values encountered on 7 and 8 Levels and the improved values from time to time on the upper levels to the east of No. 3 Shaft where formerly development results had been disappointing. This position has continued during the current year.

The ore reserves, as recalculated at December 31, 1960, amounted to 2,700,000 tons having an average value of 7.2 dwt. per ton over an estimated stoping width of 60 inches. Compared with the previous year this represented

an increase of 900,000 tons and an improvement of 0.4 dwt. per ton in the value, the estimated stoping width being unchanged.

No. 2 Shaft

Preliminary sinking of this 23½ foot diameter shaft was completed early in 1961 when a depth of 126 feet had been reached. The headgear and the 2,650 h.p. winder had been erected, the changehouse and shaft offices were complete, and full scale sinking was just starting.

This shaft was planned to be sunk to a depth of approximately 4,300 feet. Precementation was being carried out from boreholes from surface and by the end of April a total of 67,332 pockets, equivalent to 3,165 short tons of cement had been injected.

It was intended to make one of the main connections between the No. 3 Shaft working and No. 2 Shaft by driving a crosscut from No. 3A Incline Haulage on 9 Level to effect a holing with the new shaft some 3,500 feet to the east. This crosscut was now within 2,500 feet of No. 2 Shaft. Reef development on 8 and 9 Levels from No. 3A Incline was being delayed by water-bearing fissures.

Reduction Work

At present the plant was handling rather more than its designed capacity of 90,000 tons per month. It was intended this year to increase the capacity of the reduction plant to 105,000 tons per month by the installation of two further filters and certain minor accessories and work on these extensions has already begun. However, it was unlikely that the tonnage milled could be increased beyond this figure of 105,000 tons per month until No. 2 Shaft was in operation, the limiting factor being the capacity of the present shaft system. The intention was in due course to extend the scale of operations to an ultimate milling rate of the order of 150,000 tons per month.

Water

The small conservation dam which was built in 1955 as being the quickest means

Northern Section of Lease Area

Mr. Stratten went on to say that No. 2 Shaft had been sited in a position to command a large area in the eastern portion of the property from which it was hoped substantial quantities of payable ore would be forthcoming.

Although it should thus be very many years before it became necessary to exploit the northern section of the lease area, the Company was carrying out routine diamond drilling from surface in this section so as to be able to decide in due course how it should be opened up. The results obtained in the four boreholes completed in this area during 1960, as well as a cementation borehole drilled at the site of No. 2 Shaft were given in the Report of the Consulting Engineers. Since the year end a further borehole in the northern area, No. W.S. 38, sited about 5,700 feet due north of W.S. 36, had been completed, giving 72 inch-dwt. in the original intersection of the reef at a depth of 6,057 feet and 36 inch-dwt. and 71 inch-dwt. in deflections. The Chairman pointed out that it was too early to draw any conclusions from the results of this work.

Operations in 1961

During the first four months of 1961 the tonnage milled amounted to 372,000 tons giving an average yield of 6.81 dwt. per ton and a total working profit of £635,842. The development footage totalled 20,893 feet of which £9,050 feet was on reef and sampled disclosing 6,330 feet or 70 per cent payable, averaging 478 inch-dwt.

A dividend of 5 cents, equivalent to 6d. per share was declared in March of this year.

In reply to a question by a member as to the reason for the increase in the amount on deposit with Union Corporation, Limited at the year-end, the Chairman replied that it was being kept in anticipation of capital requirements,

particularly No. 2 Shaft. These funds had earned interest of approximately £11,000.

In reply to another member who asked the Company to issue a Chairman's Statement with the Annual Report, the Chairman stated that this point of view would be noted but that the practice followed by the Company in giving information to members by way of an address at the Annual General Meeting had certain advantages and for that reason the Company had continued to follow this practice.

The Report and Accounts were adopted.

The retiring Directors, Messrs. C. B. Anderson, M. D. Banghart and T. P. Stratton, were re-elected.

BRACKEN MINES, LIMITED

Mr. T. P. Stratton, the Chairman of the Company, in addressing members at the Annual General Meeting held in Johannesburg on May 26, 1961, said that when he addressed members a year ago, No. 1A (rock hoisting) Shaft had been sunk nearly 700 feet and preparatory work was well advanced for the sinking of No 1 Shaft which was designed to handle men and materials. Since then both these shafts had been sunk to their final depths of 2,642 feet and 2,681 feet respectively and had been equipped. The necessary stations, ore and waste passes and pump chambers were being cut and a start had been made on development work underground.

Inevitably much of this initial development consisted of crosscutting southwards from the shafts to the upper levels of the mine and was therefore off-reef. But a certain amount of reef development had been accomplished on 8 level. Up to the middle of May the total footage on reef and sampled amounted to 1,390 feet of which 1,120 feet or 81 per cent proved payable with an average value of 24.6 dwt. over 18 inches, equivalent to 443 inch-dwt. This included the payable development shown in the last quarterly report which averaged 204 inch-dwt. A discount had been applied to these development values to conform with adjustments which would be necessary in estimating the ore reserves in due course. Mr. Stratton added that in relation to the size of the lease area the results obtained from this small amount of reef development had little significance.

Construction of the necessary surface works and buildings and the provision of housing for European employees were well up to schedule and were keeping pace with progress underground. The foundations of the reduction plant were now approaching completion. The plant would have an initial capacity of 75,000 tons per month and was being designed for run-of-mine milling with no primary crushing section and with automatic electronic controls, both of which were pioneered in the reduction works at Winkelhaak Mines, Limited and which had proved successful. The tube mills would be 16 feet long by 14 feet in diameter. So far as was known, these, and the similar tube mills at Leslie Gold Mines, Limited, would be the largest ever installed in a South African gold mine.

Timetable

Development had only just begun and progress in opening up the mine was naturally dependent on conditions underground, notably the extent of the faulting and the amount of water and/or gas that might be encountered. Provided all went well it was hoped to start trial milling in about twelve months' time. On this basis it might be possible for the mine to start official production and make its first declaration of output at the end of 1962 or early in 1963, i.e. about six months earlier than forecast in the Prospectus.

Finance

Up to the end of April, 1961, expenditure on property, shafts, plant and equipment and other items, including loans to the Evander Township company, amounted to £3,653,857. While the total estimated cost of taking the mine to production remained at about the same as the figure of £8,500,000 given in the Prospectus, inevitably the shortening of the timetable had led to a speeding up in the rate of expenditure and share capital funds would be exhausted somewhat earlier than was formerly anticipated.

With this in mind the Directors last year felt it would be wise to assure the major portion of the balance of funds required over and above the £7,000,000 provided in share capital and arrangements had been made with the National Finance Corporation of South Africa for a loan of £1,000,000. Half of this loan would have to be drawn by September

30, 1961, and the balance by January 31, 1962. As capital expenditure would continue to be financed by calls on the partly-paid shares until share capital funds were exhausted it might well be that the Company would in practice be drawing this loan money some months earlier than it was actually required. But the Directors felt that this was a small price to pay for the sake of insuring the financial position ahead.

Water

Last year an agreement had been concluded with the Rand Water Board whereby the Board would make available to Bracken Mines, Leslie Gold Mines, Winkelhaak Mines and Evander Township a supply of 2 million gallons of water per day and for this purpose would lay a pipeline from the Board's Selcourt Reservoir near Springs to a central service reservoir near Leven Siding with the necessary branch pipelines. The cost of the scheme, including interest on capital, would be recovered by the Board from the four companies concerned over a period of twenty years through charges for the water supplied.

Excellent progress was being made and it now seemed possible that water from this source would be available within the next twelve months.

The Report and Accounts were adopted.

The retiring Directors, Messrs. C. B. Anderson, E. Jacobson and M. W. Richards, were re-elected.

LESLIE GOLD MINES, LIMITED

Mr. T. P. Stratton, the Chairman of the Company, in addressing members at the Annual General Meeting held in Johannesburg on May 26, 1961, said that when he addressed members a year ago the smaller, No. 1A Shaft had been sunk over 500 feet and preparatory work was well advanced for the sinking of the larger, 23 foot diameter, No. 1 Shaft. He had indicated then that while it was intended to continue No 1 Shaft down to a final depth of about 3,100 feet, it was planned to sink No. 1A Shaft initially to a depth of only about 2,050 feet thus enabling an earlier start to be made with reef development on the upper levels.

On May 22, 1961, No. 1 Shaft had reached a depth of 2,929 feet, leaving only a further 245 feet or so to be sunk. No. 1A Shaft, which was sunk to a final initial depth of 2,055 feet during 1960 had now been equipped. Good progress had been made in cutting the necessary stations, ore and waste passes and pump chambers and a start had been made on the crosscuts to the reef horizon. There might be a small footage of reef development towards the end of the current quarter.

Construction of the necessary surface works and buildings and the provision of housing for European employees were well up to schedule and were keeping pace with progress underground. The foundations of the reduction plant were now approaching completion. The plant would have an initial capacity of 75,000 tons per month and was being designed for run-of-mine milling with no primary crushing section and with automatic electronic controls, both of which were pioneered in the reduction works at Winkelhaak Mines, Limited and which

had proved successful. The tube mills would be 16 feet long by 14 feet in diameter. So far as was known these, and the similar tube mills to be installed at Bracken Mines, Limited, would be the largest ever installed on a South African gold mine. It was intended as soon as possible to extend the capacity of the reduction plant to 100,000 tons per month and in due course to build up the milling rate to about 150,000 tons per month.

Timetable

Development had only just begun and progress in opening up the mine was naturally dependent on conditions underground, notably the extent of the faulting and the amount of water and/or gas that might be encountered. Provided all went well it was hoped to start trial milling about the middle of 1962. On this basis it might be possible for the mine to start official production and make its first declaration of output in the first half of 1963, i.e. about six months earlier than forecast in the Prospectus.

Finance

Up to the end of April, 1961, expenditure on property, shafts, plant and equipment and other items, including loans to the Evander Township company, amounted to £4,060,634. The speeding up of the programme and the fact that No. 1A Shaft had been stopped at 2,055 feet had resulted in some worthwhile savings in the cost of taking the mine to the point at which further capital expenditure could be financed out of profits. This

was now estimated at around £9,600,000 which compared with the former estimate of £10,200,000 given in the Prospectus.

As against this, however, the shortening of the timetable had inevitably led to a speeding up in the rate of expenditure and share capital funds would be exhausted somewhat earlier than was formerly anticipated. With this in mind the directors last year felt it would be wise to assure the major portion of the balance of funds required over and above the £8,000,000 provided in share capital and arrangements had been made with the National Finance Corporation of South Africa for a loan to the Company of £1,000,000. Half of this loan would have to be drawn by September 30, 1961, and the balance by January 31, 1962. As capital expenditure would continue to be financed by calls on the partly-paid shares until share capital funds were exhausted, it might well be that the Company would in practice be drawing this loan money some months earlier than it was actually required. But the Directors felt that this was a small price to pay for the sake of insuring the financial position ahead.

Water

Last year an agreement had been concluded with the Rand Water Board whereby the Board would make available to Leslie Gold Mines, Bracken Mines, Winkelhaak Mines and Evander Township a supply of 2 million gallons of water per day and for this purpose would lay a pipeline from the Board's Selcourt Reservoir near Springs to a central service reservoir near Leven Siding with the necessary branch pipelines. The cost of the scheme, including interest on capital, would be recovered by the Board from the four companies concerned over a period of twenty years through charges for the water supplied.

Excellent progress was being made and it now seemed possible that water from this source would be available within the next twelve months.

The Report and Accounts were adopted.

The retiring Directors, Messrs. C. B. Anderson, M. W. Richards and R. M. Strachan, were re-elected.

UNION MINIERE DU HAUT-KATANGA PROGRESS OF OPERATIONS INDUSTRIAL ACTIVITIES PRACTICALLY UNAFFECTED BY EVENTS IN THE CONGO

The Annual General Meeting of Shareholders of Union Minière du Haut-Katanga was held at Brussels on May 25, 1961, under the chairmanship of Mr. Paul Gillet, Chairman of the Board of Directors.

The meeting approved the balance sheet and the profit and loss account for the year 1960. The gross result for the year was 3,928,591,153 francs. After deduction of capital equipment amortization, provision for income tax, interest, duties and varied royalties, the net profit amounted to 2,365,820,563 francs.

The meeting fixed the net dividend for 1960 at 1,500 francs per share (or 150 francs per tenth of a share); taking into account the 600 francs paid in January 1961 (60 frs. per tenth), the balance to be distributed is 900 francs per share (or 90 frs. per tenth). Half of this balance will be payable from May 26 onwards. The Board will decide on the date of payment of the remaining half at a later date.

Mr. E. Sengier asked to be relieved of his functions as Chairman of the Permanent Committee, but remains within the Management of the Company in the quality of advisory director. The Board expressed to Mr. E. Sengier as well as to Mr. J. Cousin, Chairman of the Managing Committee, in Elisabethville, an appreciation of the services rendered to the Company during their 50 years career.

The General Meeting re-elected Mr. P. Gillet and elected Mr. M. Van Weyenberg, Vice-Chairman of the Managing Committee at Elisabethville, as Directors. Mr. G. Devillez, Director and Count Capelle, Commissary, decided not to seek a renewal of their mandate.

Resume of a Message from the Chairman, Mr. P. Gillet

The hopes expressed last year to see the newly independent Congo follow its

destiny in an atmosphere of peace and order have been dashed. However the trial has been less serious for Union Minière; the events of July, 1960, only upset the life of the Company during two or three days and were practically without any repercussion on its industrial activities as a whole.

Commercial operations carried on normally but, in 1960, the Company had to face up to important currency transfers ordered first by the Belgian Congo and then, from July 1960, by the Katanga Government.

As regards recent events, the Chairman pointed out that at the Lulu plant, the second section of 50,000 tons of copper per annum was brought into service in March 1961. The Kambove concentrator with a capacity of 720,000 tons of ore per annum was brought into operation in April 1961.

An improvement in copper prices is showing itself at present due to a reduction of stocks and to an increase in deliveries to industry. It enables the future of the copper market to be viewed with a certain optimism.

Concerning the future structure of the Company, the Chairman recalled that since Union Minière has become a Belgian limited company it has decided, within the framework of the Belgian Law of June 17, 1960, to bring to companies having registered offices in Elisabethville, the property necessary for the exercise of certain Union Minière activities in Congolese territory. This project is being elaborated.

Union Minière is giving close attention to the interests of its shareholders and is particularly preoccupied with the material and moral fate of its personnel, to whose devotion and courage the Chairman rendered homage.

The Chairman hopes that it will be possible to maintain the order which reigns in Katanga and to save from the ruins of the rest of the Congo the econo-

mic structures created by the joint effort of the Belgians and Africans.

Main points of the Board of Directors' Report

Results: The sum deposited by the Company in the form of dividends, royalties and various taxes amounted to 4,294 million francs in 1960. Of this figure, the Congolese Government, the Government of Katanga and the Belgian State received 2,617 millions, i.e. 61%, and the private shareholders 1,676 millions, i.e. 39%, the share of the Belgian State being only 88 millions.

In fact, if one takes in account the tax paid by individual shareholders on drawn dividends, the real share of the Public authorities is more than 65%. Moreover, Union Minière bears heavy educational and other expenses on behalf of the African Public authorities.

Industrial activities: Ore extraction was as intense as for the preceding year and remained centred on the Kipushi and Western mines.

Copper production, albeit reduced voluntarily by 10% from the end of September, with the idea of contributing to the stabilization of prices, nevertheless amounted to 300,675 metric tons, an increase of some 20,000 tons on 1959. The average selling price was slightly higher than that for 1959.

Production of cobalt was 8,222 tons. The price was again reduced to \$1.50 per lb. on March 1, 1960.

The production of zinc concentrates amounted to 193,004 tons at 56.6%, an increase of 50% on the 1959 production.

Deliveries of uranium oxide to the United States ended in 1960 but the European market was still supplied.

The Company delivered 27.6 grams of radium.

In addition, Union Minière produced 25,101 kgs. of germanium (against 13,643 in 1959), 208,959 kgs. of cadmium (against 98,841 in 1959), 123,258 kgs. of silver and 45 kgs. of gold.

The important event of the year has been the entry into operation of the new copper and cobalt electrolysis plant at Lulu in April 1960. These installations, started with an initial output of 50,000 tons of copper per annum, have given entire satisfaction.

Electrical energy produced by Union Minière's power stations amounted to 2,008 million kWh.

Social Situation

On December 31, 1960, the working personnel numbered 19,731 to which figure can be added 1,145 temporary workers who have been engaged with a view to easing the unemployment situation.

The staff consists of 1,755 agents which includes an increasing proportion of Africans. The promotion of African personnel remains, in fact, one of the principal concerns of the Company and good progress has been made in this respect.

More than 20,000 children attend the Company's schools and the scholastic level increases year by year. In addition, the social climate has remained very good. The order which reigns in Katanga has been a decisive element in the good progress of the Company's operations.

THE F.M.S. CHAMBER OF MINES

THE PROBLEMS OF SUSTAINING MALAYA'S TIN OUTPUT

The Annual General Meeting of the F.M.S. Chamber of Mines was held in Ipoh on May 24. The following is the speech by the President, Mr. D. R. Mitchell :—

As many of you will already know, this is the Fiftieth Ordinary General Meeting of the F.M.S. Chamber of Mines, which was first incorporated in its present form in 1914. This marks a special occasion in our history, which falls at a time when we are thankfully rid of the rigours of Tin Export Control and can feel in a much more cheerful frame of mind than we were able to do three years ago, during that difficult period when our quotas represented little more than half our productive capacity. Nevertheless, the present altered outlook for tin has brought into sharper focus the anxieties concerning the availability of new mining land and the future maintenance of Malaya's productive capacity of tin, about which my predecessors as President of your Chamber have spoken in their addresses on these occasions in past years.

Tin Production

Total deliveries to smelters from Malayan mines during the year 1960 amounted to 57,467 tons of tin-in-concentrates, of which 51,979 tons represented the total production for the year, the balance being made up from stocks accumulated at mines while Tin Export Control was in force. This figure of 51,979 tons compares with an average annual production of 60,941 tons for the four year period 1954 to 1957 which preceded the introduction of Tin Export Control. The lower figure for 1960 is partly explained, however, by the fact that, despite the higher quota releases during the first three-quarters of 1960 and the lifting of Tin Control with effect from October 1, last, many units did not resume operations in the early part of the year, in some cases because minehead stocks had been accumulated to a point where it was necessary for these to be reduced before re-starting certain plants. There were thus 45 dredges and 438 other mines in operation at the beginning of 1960, compared with 69 dredges and 522 other mines at the end of the year.

Shortage of New Mining Land

By the end of March this year, six months after Tin Export Control had been lifted, the number of active producing units was 71 dredges and 539 other mines, compared to 76 dredges and 662 other mines in December, 1957, at the time when Tin Export Control was introduced. The reduction in the number of active producing units over this period of three and a quarter years is due entirely to the shortage of new mining land.

During the first quarter of the current year Malaya's production of tin-in-concentrates amounted to 13,142 tons. Whilst it is expected that the increase in the price of tin over the past few months will stimulate output, one would not forecast Malaya's total production for 1961 at a figure higher than 55,000 tons of tin-in-concentrates.

Tin Price

The price of tin during 1960 was remarkably steady: on the Singapore market, the highest price was \$410.25 per picul of metal on August 2, and the lowest \$385.25 on May 3. Although the Buffer Stock Manager's authority to operate in the middle price range in the International Tin Agreement, that is to say between £780 and £830 per ton on the London Metal Exchange, was withdrawn with effect from July 1, the price continued to stay within the middle range. This is all the more noteworthy because of the lifting of Tin Export Control with effect from October 1 and shows the sound judgment of the International Tin Council in deciding when to suspend the control of production.

World Tin Statistics

I do not propose in this address to try to estimate how much Tin countries other than Malaya may be expected to produce during the current year, or what the consumption in the free world will amount to, since if I were to do so I would simply be passing on other people's figures which all of you have no doubt read in the press in recent weeks. I think it will suffice to say that it is generally estimated that there will be a shortfall between production and consumption of some 10,000 tons of metal, and that there are some people who think the figure will be considerably higher. This is after allowing for the net tonnage that it is estimated will be exported from the communist countries, which at this stage can be little better than a guess. Against the short-fall there is the 10,000 tons of metal held by the Buffer Stock at the beginning of the year, the 3,000 tons held by the Canadian Government, and about 4,000 tons held by the United States Government in the "Special Tin Inventory". This last amount consists of the tin metal derived from the Texas smelter after purchases for the U.S. strategic stockpile had ceased but before the smelter was sold to a commercial concern, and is not subject to the same restrictions as regards release as the main strategic stockpile.

In the tin market, the least expected often happens, and people who venture to prognosticate are fortunate if their predictions come right. At this time of year, four years ago, I do not think that anyone in this country foresaw that by the end of the year Tin Export Control would have been brought into force. However, in the general, long-term sense, it does now appear that unless in future there is considerably less demand for tin than at present, consumption can only be met by production from deposits of a lower grade than those considered economically workable at the present time. This, of course, requires higher prices of tin in the future. Consumers may feel that this would put those companies still fortunate enough to have deposits of a better grade in an unduly favourable position, but producers on their part cannot be expected to extend their operations into ground that is at present unpayable until such ground becomes an economic proposition due to a higher price of tin.

International Tin Agreement

At the conclusion of the 5-week conference of tin held in New York last summer under the auspices of the United Nations, the twenty-three participating countries unanimously resolved that the current Agreement should be renewed for a further 5-year period from July 1, 1961, in the form of a new International Tin Agreement as prepared during the course of the conference. This was a most satisfactory outcome of the lengthy deliberations that had taken place, and was an indication of the mutual confidence and understanding that had developed between producing and consuming countries through the work of the International Tin Council.

Since the New York conference the requisite number of producing and consuming countries needed to bring the new Agreement into force have either ratified it or signified their intention to ratify, and it is to be hoped that in the altered circumstances that exist at present as regards the statistical position of tin, the work of the new Council will go forward in the same spirit of friendly co-operation as has prevailed over the last five years.

The new Agreement, although it follows the same broad terms as the current Agreement, allows the International Tin Council considerably greater flexibility in certain important respects. I do not propose to attempt to describe these modifications in detail today, especially as most of you have already studied the new Agreement, but it is perhaps worth noting that although it is laid down that the new Buffer Stock of 20,000 tons shall start with 12,500 tons tin metal and the balance of 7,500 tons in cash at £730 per ton, the new Council at its first meeting can decide to vary this proportion between tin metal and cash. It certainly seems that the amount of metal placed initially in the new Buffer Stock will have to be the amount held by the current Buffer Stock at the end of June, since to take metal off the market in order to increase the new Buffer Stock's initial holding of metal would in present circumstances help no one.

As regards Malaya's domestic arrangements for financing her share of the new Buffer Stock, it is pleasing to be able to report that the Federation Government is arranging to raise a loan from commercial banks, so as to enable the miners holding certificates in the current Buffer Stock to be repaid fairly soon after the new Agreement comes into force. The amount of the loan plus interest will be recouped by way of a cess on the export of tin concentrates after July 1, 1961, thus ensuring that individual miners' shares in the second Buffer Stock will be proportionate to their production over the period required to repay the loan in full.

Land Alienation and Prospecting

Scarcity of new mining land is by far the gravest problem facing our industry at the present time, and the altered statistical position of tin has made this all the more obvious. Whilst in general State Governments have adopted a fairly liberal policy towards the issue of Prospecting Permits over State Land not scheduled for other uses and situated in localities where mining would not conflict with agriculture and other interests, it often happens at those areas which mining concerns would most like to prospect are not available, either be-

cause the land lies upstream from some form of agricultural development, or because it has been gazetted as a Malay Reserve, or for some other reason.

We miners realize that we cannot expect to be granted Prospecting Permits over every piece of land we would like to test. But what we do ask is that Prospecting Permits should always be granted, and without undue delay, unless there are compelling reasons for refusing the application. There should be no question of such applications being refused simply because there is a fear in some people's minds that mining in the particular locality might cause some interference with other interests, if the challenge imposed upon producers in the present situation is to be met. Unfortunately no one has so far discovered any large-scale alluvial tin deposits on the East Coast of this country, although a large amount of scout-boring has been done over there. It is the more developed West Coast that still offers better prospects for any new areas.

It seems to me that perhaps the length of time that has to elapse between the sinking of the first scout-bore in a new area and the production of the first picul of tin concentrates from that area is not generally appreciated. Scout-boring and subsequent close-boring for evaluation purposes may be expected to take a year, and even longer if the area is large. After the completion of boring, the issue of a mining title may be expected to take at least a further two years. No mining concern can be expected to start ordering new equipment until the issue of a mining title has been approved, or to start development work on the area until a title has been received. In the case of a dredging property, nearly two years would be required to build the dredge after the issue of the mining title. This means that production could not commence for at least five years from the time the first scout-bore was put down. Although this argument applies more to the larger dredging areas than to smaller areas suitable for gravel-pumping, even in the case of small areas there is usually a substantial time-lag between prospecting and production.

Apart from the need for the consideration of applications for Prospecting Permits and new Mining Titles to be speeded up, especially in Land Offices, it would be helpful towards the maintenance of production if applications for the renewal of leases were granted without delay, and without the imposition of restrictive conditions. This is all the more necessary in view of the probability that quite a considerable proportion of the country's future production will have to come from remnant mining in tailings areas that still contain pockets of virgin ground. It is to be hoped that tailings areas that are considered by the Mines Department to be possibly worth reworking at some future date will not be given over to some other form of land use that would preclude the possibility of their ever being mined again, except in cases where the land is urgently needed for other purposes.

Tin Export Duty

The increase in Tin Export Duty announced in the last Budget, which was brought into force with effect from January 1 last, came as a shock and a surprise to tin miners, not on account of the increase but because of the principle involved.

I do not wish to appear to complain unduly about this increase today, especially having regard to the extent by which the price of tin has risen since the beginning of the year. I feel I should mention, however, that a high rate of Export Duty—at present the rate works out at approximately 16½% of the total realization after adding back Export Duty—reacts with particular severity against the producer who is working low-grade ground and who, however great a degree of efficiency he attains in his operations, must inevitably be classed as a high-cost producer. Unlike Company Tax, Tin Export Duty immediately reduces the value to the miner of his product. This in turn, in the long-term sense, means that low-grade ground, which at a certain tin price could be classified as ore reserves if the Tin Export Duty were low, ceases to come into the category of ore reserves with a high rate of Tin Export Duty. When for the future maintenance of Malaya's productive potential so much depends upon the development of large, low-grade areas, and upon whether certain tailings areas will be worth re-working, Export Duty at the present high rate hardly seems appropriate. In saying this I am not suggesting that there should be differential rates according to the grade of ground being worked, because there are so many other factors besides the average value in terms of fraction of a kati per cubic yard, such as the nature of the ground and the ease or difficulty with which it can be dug and treated, which determine the cost of producing a picul of tin concentrate. What I do suggest is that eventually, with Tin Export Duty at its present rate instead of a lower level, less ground will be mined and less revenue will accrue to Government over the years ahead.

Those of us who have gone into the question of equipping low-grade areas, say of an average value of around 0.20 kati per cubic yard or rather less, without any rich patches to work early on for purposes of amortization, know how difficult it is to take the plunge with Export Duty at its present rate, unless one assumes that in future the price of tin is going to be much higher than at present.

The Emergency

The official declaration of the ending of the 12 year-long emergency on August 1 last year was an event of great importance, even though during the last few years mining operations generally have not been hampered by terrorist attacks. I would like to pay tribute to the splendid work of the security forces throughout the long campaign and to the resolution of all those engaged in the planting and mining industries, which helped so much towards the eventual defeat of the communist gangs.

Production of Other Minerals

The production of iron ore for 1960 amounted to over 5½ million tons, an increase of nearly 2 million tons on the figure for the previous year. This provided a significant increase to the country's exports, and so far for the current year a rate of production rather higher than the average rate for last year has been maintained.

Bauxite, too, was produced in record quantities, the total for the year amounting to approximately 450,000 tons.

On the other hand, the production of coal in Malaya came to a halt early in 1960 with the cessation of operations at Batu Arang. This was due to completion of the switch-over to fuel oil and diesel by all concerns that had previously been the major consumers of local coal, and is an instance of the adoption of substitutes resulting in the premature abandonment of a mineral deposit.

Public Relations in the U.S.A.

The Malayan Tin Bureau in Washington, which is financed entirely by the Malayan Tin Mining Industry, continued to provide a valuable link between producers in this country and consumers and government officials in the United States. The Director of the Bureau assisted in connection with the official visit of the Hon'ble the Prime Minister to the United States towards the end of last year, and was instrumental in organizing a dinner party at Pittsburgh at which the Prime Minister met representatives of the leading U.S. tinplate producers. This, from all accounts, was a most successful function.

The Directors also liaised with tin plate producers in their campaign to combat aluminium as a substitute for the canning of beer and soft drinks. The introduction of the new thin tinplate, consisting of thinner steel sheet upon which the same thickness of electrolytic tin is deposited as previously, has done much to further this campaign. Nevertheless, the development of aluminium and plastic containers continues, and the threat that substitutes may gradually make further inroads into the main use of tin cannot be discounted, especially if tin is in short supply in future years.

Relations with Government

In our relations with the Federal Government much time was occupied last year, before the New York Tin Conference, in considering the draft of the new International Tin Agreement. This work was done by the Tin Advisory Committee, which also met on occasions to consider matters affecting the operation of the International Tin Council, so as to keep the Malayan Delegate to the International Tin Council informed of the Industry's views, and also to consider matters in connection with Malaya's domestic Tin Control Regulations.

A meeting was held last September with the Menteri Besar, Perak, in order to clarify certain matters concerning the Perak State Government's policy in regard to mining land applications.

On behalf of the Council, I wish to express our appreciation to the Ministers and Assistant Ministers with whom our Chamber comes into contact, and to the officers of those Ministries, for the courteous and patient manner in which they have received us and for the assistance they have given us. Also, I wish to express our thanks to the officers of the Mines Department, and, in particular, to the Chief Inspector of Mines, for their understanding of our problems and for the close co-operation they have given us. The Chief Inspector of Mines has done much to assist the Industry in every respect.

Acknowledgments

Our sincere thanks are also due to Sir Vincent del Tufo who continued to serve so ably as Malaya's Delegate to the In-

ternational Tin Council. Those of us who attended the New York Tin Conference know under what great pressure he worked throughout the five weeks taken for the Conference, and what an important part he played in bringing the deliberations to a successful conclusion.

I am sure that you will wish me to pay tribute to Mr. Dunne, who served as a member of this Council for many years until taking up residence in England last year, and who contributed much to the work performed by our Council.

I wish to record the appreciation of the members of my Council for the efficient services rendered by our Secretary, Mr. Pearson, and by Mr. Deller who acted as Secretary while Mr. Pearson was absent on six months' leave during the past year. Both these gentlemen have had their time fully occupied not only with the work of this Chamber but also with the affairs of the M.M.E.A., the Tin Industry (Research and Development) Board and the Publicity Management Committee.

Finally, I would like to thank members of the Council and in particular the Vice-President, Mr. Thomson, who acted for me from May to August last year, for their support, and also Mr. Chong Khoon Lin, President of the All-Malaya Chinese Mining Association, for the continued co-operation that has been maintained between our two Associations.

THE CONSOLIDATED ZINC CORPORATION

MR. L. B. ROBINSON'S STATEMENT

The 12th Annual General Meeting of The Consolidated Zinc Corporation Limited will be held on June 20 at 6 St. James's Street, London, S.W.1.

The following is an extract from the Statement by **Mr. L. B. Robinson**, the chairman, which has been circulated with the report and accounts :

The group profit before mining royalty and taxation amounted to £3,636,434 compared with £3,699,759 for 1959, a decrease of £333,325.

The Zinc Corporation, Limited increased the output of ore by nearly 10 per cent but the production was adjusted to achieve a lower average lead grade and a higher average zinc grade. As a result lead output was reduced below that for the previous year while production of zinc concentrate was increased and with a slightly lower average cost per ton of ore a substantial increase in profit over 1959 was achieved.

In the United Kingdom trading profits on zinc smelting at Avonmouth and on sulphuric acid showed a satisfactory improvement over 1959, but these were more than offset by heavy expenses incurred at Swansea with the closing-down of the horizontal retorts and the costs of bringing the first large-scale Imperial Smelting furnace up to full production and efficiency; by a decline in the profits on pigments due to competition and lower profit margins, and by some loss on writing down stocks. The overall trading results in the United Kingdom were therefore substantially lower than in 1959. Revenue from licensing the Imperial Smelting process, less expenditure thereon, amounted to £283,341, a decrease of £158,796 on 1959. The process is licensed on the basis of a down-payment when the agreement is signed and annual royalties for a period of ten years

from the time when the plant commences operations. During the present stage when revenue consists primarily of down-payments it is inevitable that the revenue should fluctuate from year to year.

Income from trade investments amounted to £1,105,786 compared with £914,667 for 1959. The increase is almost wholly attributable to the considerably higher dividends received during the year from New Broken Hill Consolidated Limited and British Titan Products Company Limited.

Depreciation amounted to £1,462,227 compared with £1,270,357 for 1959, an increase of £191,870 attributable to the new plant commissioned during the year.

The consolidated net profit for the year amounted to £2,295,660 which shows a decrease of £367,607 compared with 1959.

Following the practice initiated last year, a transfer has been made to exploration reserve of £225,000 compared with £280,000 for 1959. Transfers to general reserves have been made of £625,000 compared with £950,000 last year.

The directors recommend that a final dividend should be paid at the rate of 2s. 9d. per share, the same as last year, giving a total distribution for the year of 4s. per share, the same as for 1959.

On February 6, 1961, we sold 50 per cent of our holdings in Comalco to Kaiser Aluminum & Chemical Corporation for an amount, including a premium of \$3,500,000, of £2,848,273.

At an extraordinary general meeting held on December 29, 1960, shareholders ratified an agreement with The British South Africa Company Holdings Limited by which that company and certain of its associates would subscribe £10,000,000 of 5½ per cent unsecured loan stock. As shareholders were advised at the time, the purpose of this loan is to raise part of the funds which the company will be required to provide for the Comalco project.

NEW BROKEN HILL CONSOLIDATED

HIGHER PROFITS AND DIVIDEND

The 25th Annual General Meeting of New Broken Hill Consolidated Limited will be held on June 20 at 37 Dover Street, London, W.1.

The following is an extract from the Statement by **Mr. L. B. Robinson**, the chairman, which has been circulated with the report and accounts :

In 1960 the output of ore was appreciably greater than in 1959, but was regulated so as to extract a far lower average lead grade and a higher average zinc grade. The result was to maintain the average cost per ton of ore close to that for the previous year, to keep lead output in line with the reduced level of realizations agreed at the meetings of the International Lead and Zinc Study Group and at the same time increase appreciably production and realizations of zinc concentrate. The average London Metal Exchange prices during 1960 were £72 2s. 11d. for lead, compared with £70 15s. 7d. for 1959, and £89 5s. 11d. for zinc, compared with £82 4s. 8d. for 1959.

The result for the year was a trading balance of £2,075,534 compared with £1,531,700 for 1959.

Depreciation amounted to £301,450 compared with £333,140 for the previous

year, and after deducting other charges and adding miscellaneous income the profit before taxation amounted to £1,806,472 compared with £1,190,847 for 1959.

The provision for Australian and United Kingdom taxation on the profits for the year amounts to £669,087 compared with £394,609 for 1959.

The result is a net profit of £1,137,385 compared with £796,238 for 1959.

A transfer of £395,000 has been made to mine amortization reserve, compared with £245,000 for 1959.

The directors are recommending that a final dividend should be paid at the rate of 2s. 0d. per share, free of tax, compared with 1s 6d. per share, free of tax, last year. This gives a total free of tax dividend of 3s. 0d. per share compared with 2s. 3d per share for 1959.

The company agreed in December 1960 to acquire at par 25 per cent of the share capital of Sulphide Corporation Pty. Limited, a company producing sulphuric acid and fertilizers at Cockle Creek, New South Wales and about to operate a lead/zinc smelter on the same site. N.B.H.C. Pty's proportion of the share capital will be £A.1,875,000 of which £A.1,400,000 was subscribed in December 1960 and the balance will be subscribed in mid-1961.

Development and Diamond Drilling

In my statement last year I referred to the progress made in the work of delineating the high-grade zinc sections of the siliceous zinc lode between Nos. 12 and 16 levels. These zinc-rich sections of the mine are the means of providing flexibility in the production of zinc concentrate as opposed to lead concentrate. This is particularly important in times like the present when the demand for zinc concentrate is greater than that for lead concentrate.

During 1960, diamond drilling was continued on Nos. 14 and 16 levels to outline the general shape of the orebody. Developments for extraction were carried out on No. 15 level. The drive south on No. 16 level had reached a point 3,256 ft. south of our northern boundary at the close of 1960. This drive has now intersected the siliceous zinc lode, the upper limit of which passes below No. 14 level at approximately 3,460 feet south of our northern boundary. Testing of this orebody will be continued during 1961.

Results of exploration to date indicate that major sections of these zinc-rich areas will be amenable to large-scale mining methods.

An area between Sections 75 and 82 has been selected for the initial mining by sub-level blasthole methods.

DAVIES INVESTMENTS LTD.

Private Bankers (Gross assets exceed £2,500,000), are paying 7½% p.a. interest on deposits for the eighth year in succession, with extra ½% added annually on each £500 unit. Details and Audited Balance Sheet from Investment Dpt. MN., Davies Investments Ltd., Danes Inn House, 265 Strand, London, W.C.2.

